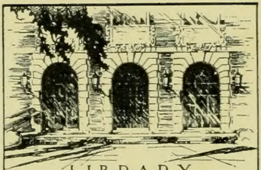

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PHYCOLOGIA BRITANNICA:

OR

HISTORY OF BRITISH SEA-WEEDS,

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CONTAINING

COLOURED FIGURES, GENERIC AND SPECIFIC CHARACTERS,
SYNONYMES, AND DESCRIPTIONS

OF

ALL THE SPECIES OF ALGÆ INHABITING THE SHORES OF THE

BRITISH ISLANDS.

BY

WILLIAM HENRY HARVEY, M.D., M.R.I.A.,
Keeper of the Herbarium of the University of Dublin, and
Professor of Botany to the Royal Dublin Society.

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VOL. II.

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1849.

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rather firm, adhering, but not very closely, to paper, and without gloss when dry.

This pretty species appears to have been first found, nearly half a century ago, by the late Mr. Brodie of Brodie, whose name it deservedly bears. Mr. Brodie, indeed, considered it identical with the *Conferva purpurascens* of Hudson: a doubtful synonyme, referred by Agardh to his *Cal. versicolor*, and applied by Sir James E. Smith ('E. Bot.' t. 2465.) to a plant found on the beach at Brighton by Mr. Borrer, which, to judge by the figure, has most of the characters of *C. roseum.* Hudson's brief description is insufficient, in the absence of authentic specimens, to ascertain the plant he had in view, and, therefore, when describing the present species in the 'British Flora' I assigned to it a new name.

Cal. Brodiæi has much the habit of a small specimen of *C. tetragonum*; the conical outline, undivided shrubby stem and lateral branches, are common to both. But the microscopic characters show a much nearer affinity with *C. Hookeri*, to some varieties of which it make a very near approach. In the individuals producing *tetraspores*, which are always more slender, and more regularly branched than those which bear *favellæ*, the pinnules are pretty constantly furnished with short, secund ramuli in their upper half. In *C. Hookeri* such ramuli are either absent or are alternate, and more patent. In the length of the joints there is not much difference, and both species have sub-opake stems, traversed by densely packed articulated veins. I have not received any specimens of *C. Brodiæi* from the continent, nor am I aware that it has been found out of Britain.

Fig. 1. CALLITHAMNION BRODIÆI:—*of the natural size.* 2. Portion of a branch, with secondary branches. 2. A plumule. 4. Tetraspores, *in situ.* 5. Branchlet with a *favella.* 6. A portion of one of the main branches, showing the veins:—*all more or less highly magnified.*

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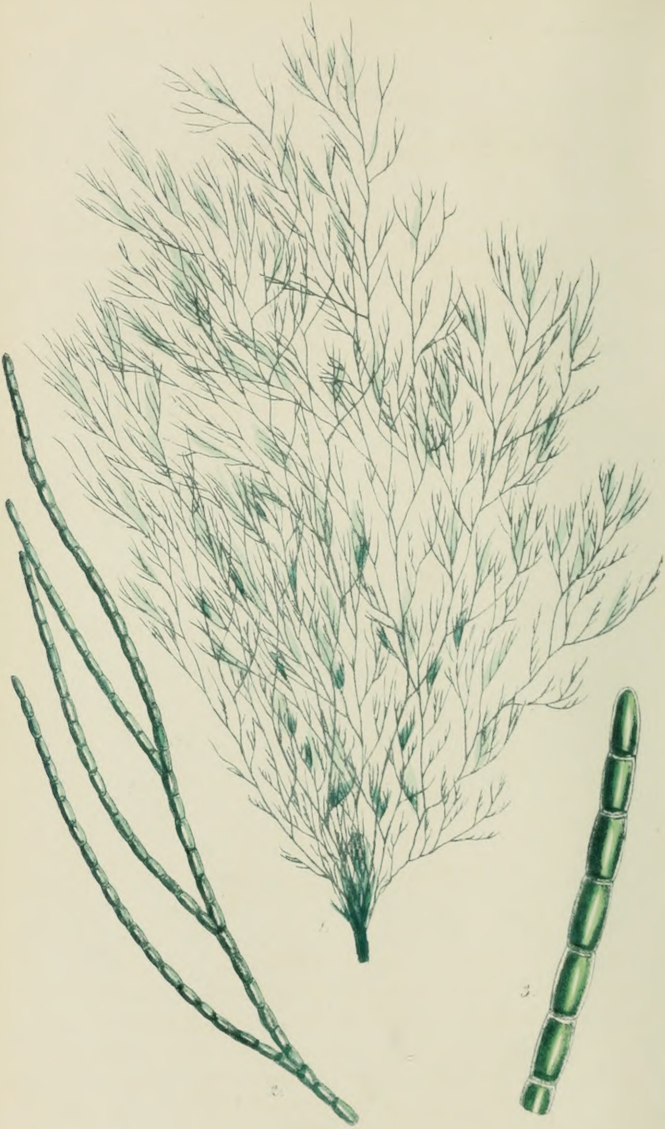
Plate CXXX.



W.H.H. del. et lith.

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PLATE CXXX.

CLADOPHORA DIFFUSA, *Harv.*

GEN. CHAR. *Filaments* green, jointed, attached, uniform, branched. *Fruit*, aggregated granules or zoospores, contained in the joints, having at some period a proper ciliary motion. CLADOPHORA (*Kütz.*),—from κλάδος, a *branch*, and φορέω, to *bear*.

CLADOPHORA *diffusa*; filaments sub-setaceous, loosely tufted, rigid, dark or full green, flexuous, much branched; branches distant, elongated, irregularly subdivided, or somewhat dichotomous, furnished towards the top with a few secund, simple ramuli; articulations 3–4 times longer than broad.

CONFERVA diffusa, *Roth, Cat. Bot.* vol. ii. p. 207. t. 7. *Dillw. Conf.* t. 21. *E. Bot.* t. 2289. *Ag. Syst.* p. 116. *Harv. in Hook. Br. Fl.* vol. ii. p. 358. *Harv. in Mack. Fl. Hib.* part 3. p. 229. *Harv. Man.* p. 136. *Wyatt, Alg. Danm.* no. 144. *J. Ag. Alg. Medit.* p. 13.

CONFERVA distans, *Ag. Syst.* p. 120.

HAB. On rocks and stones between tide marks, and in clear pools near low-water mark. Annual. Summer. Near Swansea, *Dillwyn.* Torbay, *Mrs. Griffiths.* Falmouth, *Miss Warren.* Aberffraw, *Mr. Ralfs.* Sidmouth, *Rev. R. Cresswell.* Malbay, *W. H. H.*, and in other places. Port Rush, *Mr. Moore.*

GEOGR. DISTR. Atlantic shores of Europe. Mediterranean Sea.

DESCR. *Filaments* from six to twelve inches long, or more, as thick as horsehair, cylindrical, equal, loosely tufted, generally so rigid as to bristle and stand out, one from another, when removed from the water; occasionally flaccid, flexuous, much branched. *Branches* rather distantly placed, long, irregularly subdivided in a manner between alternate and dichotomous, sometimes repeatedly, sometimes but slightly branched, the lesser divisions either long, simple, and quite naked, or bearing towards their extremities a few simple secund ramuli. *Joints* tolerably uniform in all parts of the frond, twice, thrice or four times as long as broad. *Colour*, when young, a full and rather dark, glossy green, afterwards paler and more yellowish. In drying, the plant adheres, but not strongly, to paper.

The *Conferva diffusa* of British authors, here figured, is, perhaps, scarcely sufficiently distinct from *Cladophora Hutchinsiæ*, represented in Plate CXXIV. As already remarked, it is more slender than the typical form of that species, its branches are less frequently divided, the ramuli longer, more distant and simple, the joints longer, and the substance less firm and rigid.

Still specimens frequently occur which seem to connect the two.

This species was discovered by the late Professor Mertens, on the coast of Holland, about the close of the last century, and first published by Roth, in his 'Catalecta.' Mr. Dillwyn soon afterwards detected it near Swansea. It does not appear to be uncommon on the rocky parts of our shores, growing generally in clear water, and most frequently in deep pools near low-water mark. Seen under water it has much of the glaucous colour of *C. Hutchinsiæ*; sometimes it occurs of a darker green, and then approaches some of the less branched forms of *C. rupestris*, but is a larger and stronger growing plant.

Fig. 1. Cladophora diffusa:—*of the natural size.* 2. Part of a filament. 3. Apex of a branchlet:—*both magnified.*

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Plate CXXXI.

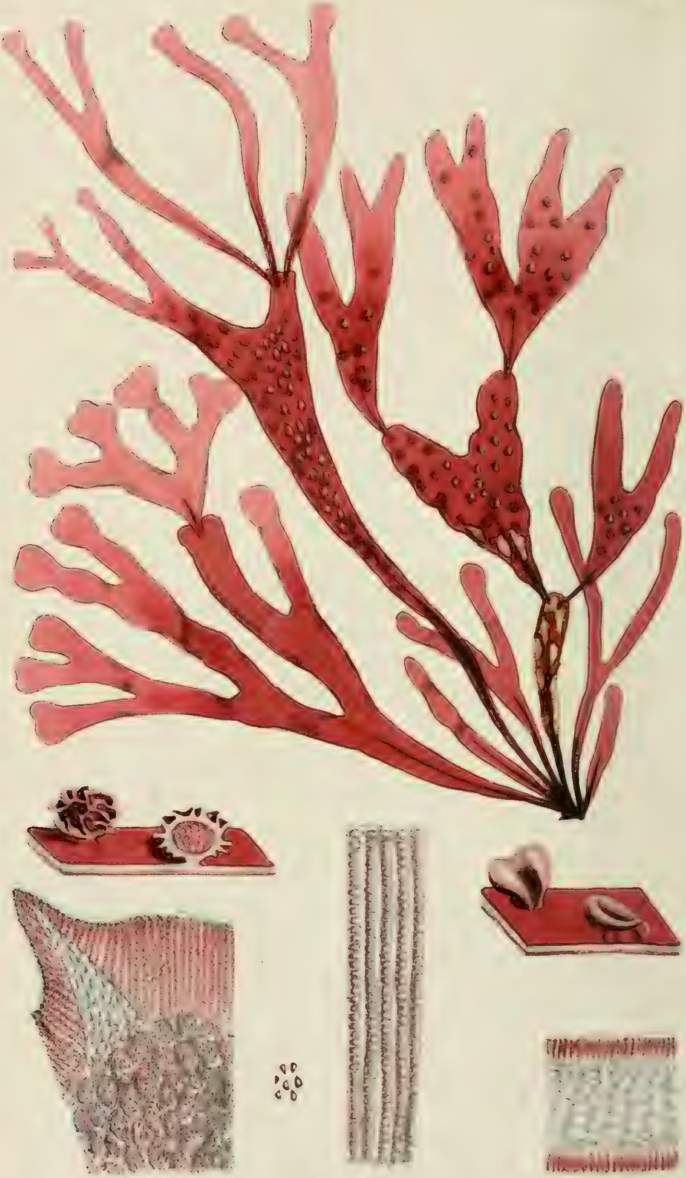

PLATE CXXXI.

PHYLLOPHORA RUBENS, *Grev.*

GEN. CHAR. *Frond* stipitate, rigid-membranaceous, proliferous, nerveless, or with a vanishing nerve, cellular; cells minute, angular, gradually smaller towards the surface. *Fructification*; 1, *tubercles (favellidia)* scattered over the frond, containing masses of minute spores; 2, *warts* (*nemathecia*) seated on the frond, composed of radiating, moniliform filaments, whose lower articulations are at length converted into spores? 3, *tetraspores* (on distinct plants) collected into sori, either towards the apex of the frond or in proper leaflets. PHYLLOPHORA (*Grev.*),—from φύλλον, a *leaf*, and φορέω, to *bear.*

PHYLLOPHORA *rubens*; stem very short, expanding into a sub-linear or cuneate, simple or forked, rigidly membranaceous, obscurely mid-ribbed frond, which is repeatedly proliferous from the surface; tubercles scattered, wrinkled or crested with sinuous folds; warts concealed under leafy processes.

PHYLLOPHORA rubens, *Grev. Alg. Brit.* p. 135. t. 15. *Hook. Br. Fl.* vol. ii. p. 303. *Wyatt, Alg. Danm.* no. 29. *Harv. in Mack. Fl. Hib.* part 3, p. 202. *Harv. Man.* p. 79. *Endl. 3rd Suppl.* p. 38. *Kütz. Phyc. Gen.* p. 412.

SPHÆROCOCCUS rubens, *Ag. Sp. Alg.* vol. i. p. 237. *Ag. Syst.* p. 213. *Hook. Fl. Scot.* part 2. p. 102. *Grev. Fl. Edin.* p. 296. *Spreng. Syst. Veg.* vol. iv. p 335.

CHONDRUS rubens, *Lyngb. Hyd. Dan.* p. 18.

DELESSERIA rubens, *Lamour. Ess.* p. 38.

FUCUS rubens, *Linn. Sp. Pl.* p. 1630. *Good. and Woodw. in Linn. Trans.* vol. iii. p. 165. *Turn. Syn.* vol. ii. p. 216. *Turn. Hist.* t. 12. *E. Bot.* t. 1053. *Stack. Ner. Brit. ed.* 2. t. 19. *Hook. Iceland Tour*, vol. ii. p. 347.

FUCUS prolifer, *Lightf. Fl. Scot.* p. 949. t. 30. *Esper, Ic. Fuc.* t. 129.

FUCUS epiphyllus, *Fl. Dan.* t. 708.

FUCUS crispus, *Huds. Fl. Ang.* p. 580.

HAB. On the shelving, rocky sides of deep tide pools near low-water mark, under the shadow of *Laminariæ*; also on rocks, stones and nullipores, beyond tide marks, from four to fifteen fathoms. Perennial. Winter. Frequent on the British coasts, from Orkney to Cornwall.

GEOGR. DISTR. Atlantic coasts of Europe from Iceland to Spain. Baltic Sea.

DESCR. *Root* an expanded callus. *Fronds* densely tufted, from three to eight or ten inches in length, rising with a short cylindrical stem, which gradually passes into the flattened, obscurely mid-ribbed, attenuated base of a linear-wedge-shaped lamina; this primary lamina is sometimes quite simple, but is more frequently forked, and often many times dichotomous, each segment being linear and very obtuse. The width of the segments is commonly about a quarter of an inch, but some varieties are nearly an inch broad. The narrower ones are always the longest. From the primary leaf spring numerous other leaves, of similar form, all of them minutely stipitate and furnished with a more or less obvious mid-rib in their lower part. *Tubercles* densely scattered over the surface of the fronds, or forming lines within the margin, spherical, fixed by a narrow base, everywhere covered with sinuous plates or folds, which give them a very wrinkled aspect; containing, under a thick pericarp composed of vertical filaments, a spherical deep-red mass, consisting of innumerable minute spores, collected in small parcels, several of which make up the aggregate mass. *Nemathecia* concealed under leafy obovate processes, which are thickly dispersed over the surfaces of distinct plants, formed altogether of moniliform filaments, which I have not observed to be converted into spores. *Tetraspores* unknown. *Colour* a fine, full deep-red, becoming darker in drying. *Substance* rigid, tough, and not adhering to paper in drying. The plant may be kept in fresh water a considerable time without injury.

A common species on all the rocky shores of Northern Europe, growing at the extremity of low-water mark under the ledges of shelving rocks, in places where it is seldom exposed either to the sun or air. When free from parasites, which is rarely the case, its clear red colour, and glossy surface render it a very ornamental plant. More usually it is disfigured by *Melobesiæ* and *Flustræ*, so as to destroy much of its beauty. It is very closely allied to the *P. nervosa* of the south of Europe, which chiefly differs in having a more strongly marked mid-rib, and a more undulating margin, characters which vary considerably in different specimens. Some specimens of *P. nervosa*, such as those represented in Turner's figure, do indeed look very different from our plant, but others in my possession exhibit scarcely a more definite nerve than is found in many British specimens of *P. rubens*.

Fig. 1. PHYLLOPHORA RUBENS:—*of the natural size*. 2. Tubercles, attached to the frond. 3. Section of a tubercle. 4. Spores. 5. Leafy processes, with *nemathecia* at their base. 6. Filaments from one of the nemathecia. 7. Section of the frond, showing the cells of which it is composed:—*all more or less magnified*.

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Plate CXXXII.

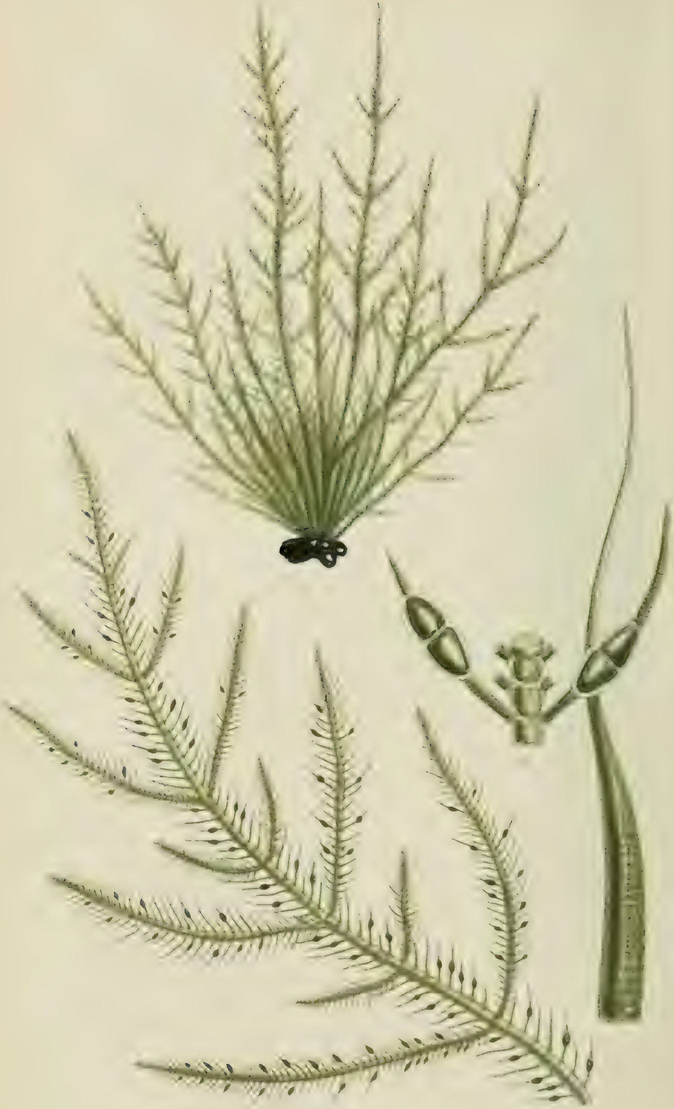

PLATE CXXXII.

ECTOCARPUS MERTENSII, *Ag.*

GEN. CHAR. *Frond* capillary, jointed, olive or brown, flaccid, single-tubed. *Fruit* either spherical, elliptical, or lanceolate *utricles* (or *spores*), borne on the ramuli, or imbedded in their substance. ECTOCARPUS (*Lyngb.*),—from *ἐκτὸς*, *external*, and *καρπὸς*, *fruit*.

ECTOCARPUS *Mertensii*; distichous; branches opposite, of unequal length, linear, mostly undivided, closely set, throughout their whole extent with slender, subulate, opposite ramuli; joints of the stem longitudinally striate, transparent, with a central coloured band, rather shorter than their breadth; spores binate, imbedded in the ramuli.

ECTOCARPUS Mertensii, *Ag. Sp. Alg.* vol. ii. p. 47. *Hook. Br. Fl.* vol. ii. p. 327. *Wyatt, Alg. Danm.* no. 130. *Harv. Man.* p. 43. *Endl.* 3rd *Suppl.* p. 21.

CONFERVA Mertensii, *E. Bot.* t. 999. *Dillw. Conf. Suppl.* p. 79.

HAB. On mud covered rocks and stones, near low-water mark and at a greater depth. Annual. April and May. Rare; but pretty generally distributed. Yarmouth, *Mr. Wigg.* Coast of Durham, *Mr. W. Backhouse.* Torbay, *Mrs. Griffiths.* Salcombe, very fine, *Mrs. Wyatt.* Sidmouth, *Miss Cutler.* Marazion and Ilfracombe, *Mr. Ralfs.* Mount Edgecumbe, Plymouth, *Rev. W. S. Hore* and *Mr. Rohloff.* Bantry Bay, *Miss Hutchins.* Dredged in Strangford Lough, *Mr. W. Thompson.* Howth, *Dr. Coulter.* Cove of Cork and Malahide, *W. H. H.* Carrickfergus and Roundstone Bay, *Mr. Mc' Calla.* Orkney, *Rev. J. H. Pollexfen.*

GEOGR. DISTR. British Islands. Atlantic shores of France.

DESCR. *Fronds* densely tufted, but not in the least matted together. *Stems* from two to six, or more rarely twelve inches in length, nearly or entirely simple, closely furnished from the base to the apex with distichous, opposite, erecto-patent, lateral branches, which are of very unequal length, long and short being indiscriminately mixed together, These primary branches are, in large specimens, furnished with a second or third series, also very unequal in length, but none of them long, so that the general outline of the main branch is narrow. Both primary and secondary branches are pectinated, at every joint, with a pair of opposite, subulate, patent ramuli, which in young specimens terminate in a long, hair-like acumination, that drops off at a later period of growth. *Joints* of the stem rather shorter than broad, with a central band; those of the ramuli very many times shorter than broad, each formed of several cellules. *Spores* immersed in the subulate ramuli about the centre, growing in pairs, separated by a transparent line, each spore of a half ellipsoid shape, dark olive. *Colour*, when young, a clear brown olive, becoming foxy when old, and acquiring a greenish shade, if dried after some steeping in fresh water. *Substance* flaccid. The plant closely adheres to paper.

This charming plant, one of the rarest and most beautiful of the filiform marine Algæ, is one of the many interesting discoveries which we owe to Mr. Lilly Wigg, of Yarmouth, who first gathered it in the year 1799. It was named by Mr. Turner in compliment to the late celebrated Professor Mertens, of Bremen, "as well to bear testimony to his unwearied zeal and extensive knowledge of the confervoid Algæ, as in token of private respect"; and, though not the discoverer of this species, it cannot be questioned that the compliment was very appropriately and justly paid. No botanist of his day, with the exception of Mr. Turner himself, was so deeply skilled in the study of marine botany, as Professor Mertens.

Ectocarpus Mertensii, from the date of its first discovery to the year 1834, was found in such small quantities that it was known to very few botanists, except by the figure in 'Eng. Bot.' In that year it was gathered by Mrs. Griffiths, Miss Cutler, and Mrs. Wyatt, in three stations on the Devonshire coast, and in considerable plenty; and, more recently, it has been detected in many localities by various collectors. In land-locked harbours, such as Salcombe, it attains a very large size, some of Mrs. Wyatt's specimens being upwards of a foot in length. In more exposed places it seldom exceeds three or four inches. It is in greatest beauty in April and May, at which time its fronds are glossy, beautifully feathered and of a clear olive; later in the season it becomes browner, and looses much of the feathery appearance. In some respects it exhibits a transition to *Sphacelaria*, proving the close connection which exists between that genus and *Ectocarpus*, and the little necessity there is for placing them in different families, as is now done by Continental authors.

Fig. 1. ECTOCARPUS MERTENSII:—*of the natural size.* 2. Upper portion of a branch. 3. Fertile ramuli, with the immersed, binate spores. 4. Apex of a young ramulus, ending in a fibre:—*all more or less highly magnified.*

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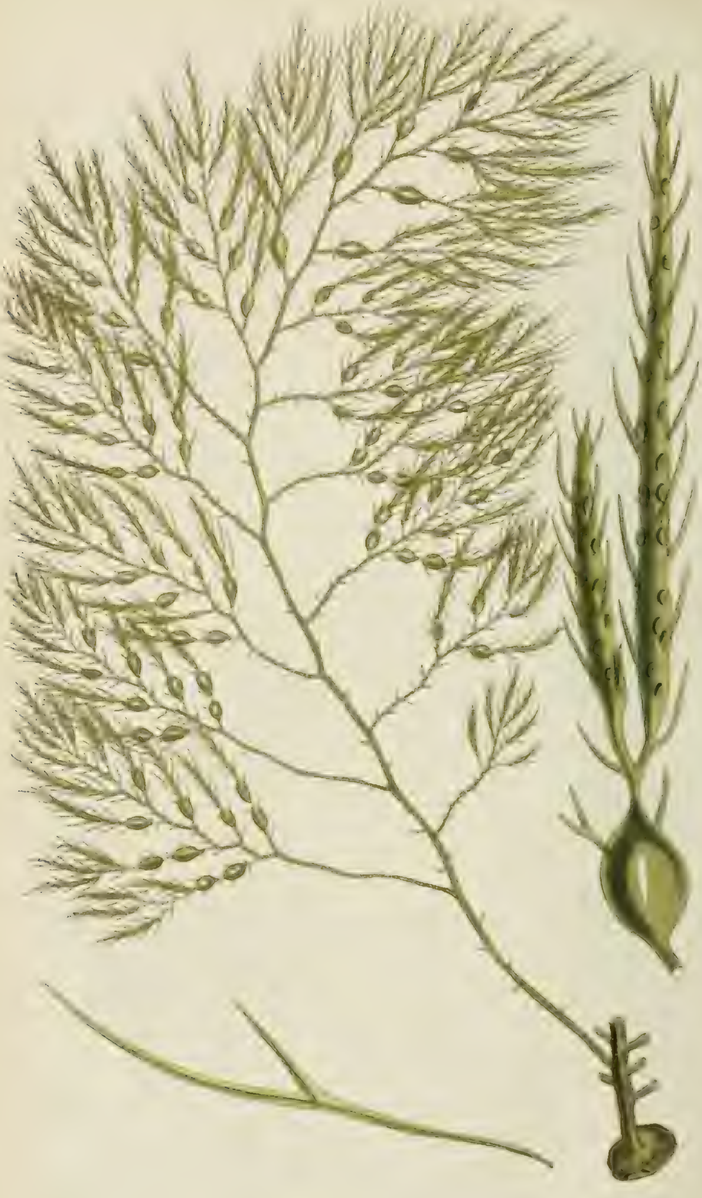

PLATE CXXXIII.

CYSTOSEIRA FIBROSA, *Ag.*

GEN. CHAR. *Frond* much branched, occasionally leafy at the base; *branches* becoming more slender upwards, and containing strings of simple air-vessels within their substance. *Receptacles* terminal, small, cellular, pierced by numerous pores, which communicate with immersed, spherical *conceptacles*, containing parietal *spores*, and tufted *antheridia*. CYSTOSEIRA (*Ag.*),—from κύστις, a *bladder* and σειρὰ, a *chain*; because the air-vessels are often arranged in strings.

CYSTOSEIRA *fibrosa*; stem woody, compressed, very much branched; branches slender, alternately bi-tri-pinnate, pinnules furnished with linear, setaceous, acute ramuli; vesicles elliptical, solitary or in pairs, immersed in the smaller branches, remote from the apices; receptacles linear, very long, more or less clothed with setaceous ramuli.

CYSTOSEIRA fibrosa, *Ag. Sp. Alg.* vol. i. p. 65. *Ag. Syst.* p. 285. *Spreng. Syst. Veg.* vol. iv. p. 317. *Grev. Alg. Brit.* p. 8. *Hook. Br. Fl.* vol. ii. p. 266. *Harv. in Mack. Fl. Hib.* part 3. p. 168. *Harv. Man.* p. 19. *Wyatt, Alg. Danm.* no. 52. *Endl. 3rd Suppl.* p. 30. *Fl. Dan.* t. 1902.

PHYLLACANTHA fibrosa, *Kütz. Phyc. Gen.* p. 356.

FUCUS fibrosus, *Huds. Fl. Ang.* p. 575. *Good. and Woodw. in Linn. Trans.* vol. iii. p. 137. *With.* vol. iv. p. 87. *Stack. Ner. Brit.* p. 80. t. 14. *Turn. Syn.* vol. i. p. 93. *Turn. Hist.* t. 209. *E. Bot.* t. 1969. *Lamour. Ess.* p. 18.

FUCUS abrotanoides, *Gmel.* p. 89. *Esper*, p. 65. t. 29.

FUCUS baccatus, *Gmel.* p. 90. t. 3. f. 2. *Esper, Ic.* p. 108. t. 54.

FUCUS setaceus, *Huds. Fl. Ang.* p. 575.

HAB. On rocks, near low-water mark and in tide-pools; also in 4–15 fathom water. Perennial. Summer. Frequent on the shores of England and of the north, west, and south of Ireland. Not found in Scotland.

GEOGR. DISTR. Atlantic shores of Europe, from England to Spain.

DESCR. *Root* a large, hard, conical expansion. *Fronds* mostly solitary, from two to three feet long, or more, very bushy, and excessively branched. *Main stem* as thick as a swan's quill, simple, or once or twice branched, from six inches to a foot in length, furnished throughout with alternate, subdistichous slender branches, accompanied by more or less numerous, linear, simple or forked, narrow leaves, which are furnished with a mid-rib and attenuated to each extremity. *Branches* from one to two feet in length, as thick as small twine, somewhat compressed, gradually attenuated from the base to the apex, but without any swelling at the base, more or less naked below, and rough with the remains of broken ramuli, closely pinnated above with alternate, distichous branchlets, which in like manner are pinnated with a second, and these with a third series of branchlets, gradually becoming smaller and more slender. In the last series, which are more or less clothed with setaceous simple or forked ramuli, from a quarter inch to upwards of an inch in length, are imbedded one or two elliptical vesicles from one to two lines in diameter. The receptacles terminate most of the lesser branches of fertile specimens, and are often much produced: when young, they are clothed with setaceous ramuli, exactly as the barren pinnules, but become more or less naked in an advanced state, and at length torulose. They contain numerous conceptacles, of the usual structure. *Substance* woody in the stem, coriaceous and tough in the branches. *Colour* a yellowish olive green, becoming black in drying.

This is the largest and finest of the British *Cystoseiræ*, and when grown under circumstances favourable to its full developement, it is a very handsome plant. Our figure represents only the lower part of a stem, and one of the branches. To do full justice to the frond would require a folio plate.

The principal stem near its base, and some of the lower branches, which are shorter and more simple than the rest, produce numerous simple or forked linear, mid-ribbed leaves, one of which is represented at fig. 2. These are borne nearly in the order of the usual ramuli, but sometimes more densely inserted, and almost fasciculate.

From *C. ericoides*, with which only among British species it can be confounded, *C. fibrosa* may always be known by its more slender branches, the large size of its air-vessels, and the very long, filiform receptacles clothed with setaceous ramuli; nor does it exhibit, when growing, those brilliant rainbow tints for which *C. ericoides* is so remarkable. It is by no means so commonly clothed with animal parasites as our other species, but is frequently infested with *Elachistea flaccida*, a plant which I believe to be peculiar to it.

Fig. 1. CYSTOSEIRA FIBROSA. 2. One of the leaves:—*both of the natural size.*
3. Receptacles and vesicle:—*slightly magnified.*

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Plat XXXIV.

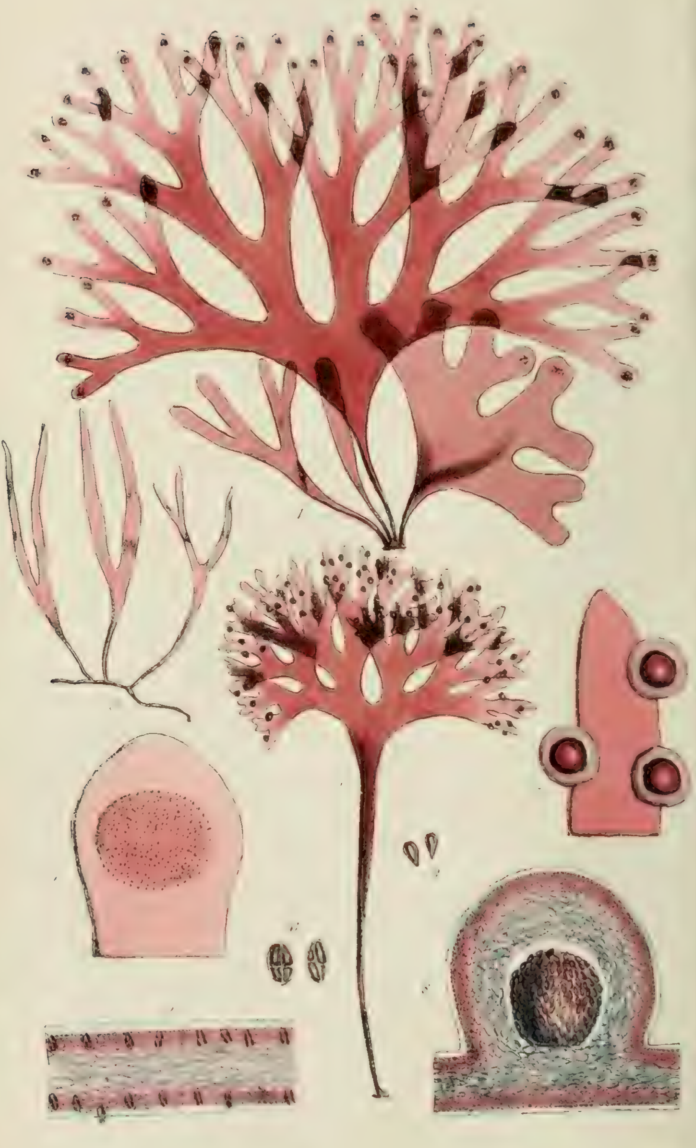

Plate CXXXIV.

RHODYMENIA PALMETTA, *Grev.*

Gen. Char. *Frond* flat, membranaceous or subcoriaceous, ribless, veinless, cellular; central cells of small size; those of the surface minute. *Fructification* of two kinds on distinct individuals; 1, convex *tubercles* (*coccidia*) having a thick cellular pericarp, and containing a mass of minute spores, on a central placenta. 2, *tetraspores,* either zoned or tripartite, imbedded among the cells of the surface, scattered, or forming cloudy patches. Rhodymenia (*Grev.*),—from ῥόδεος, *red,* and ὑμην, a *membrane.*

Rhodymenia *Palmetta;* stem cylindrical, sub-simple, expanding into a fan-shaped, rose-red frond, which is more or less deeply cleft in a dichotomous manner; segments linear-wedge-shaped, with broad, rounded interstices, and a very entire, flat margin; apices, according to the state of fructification, either erose or rounded; tubercles sessile, very convex, marginal or scattered; tetraspores cruciate or tripartite, forming deep-red sori in the expanded apices.

Rhodymenia Palmetta, *Grev. Alg. Brit.* p. 88. t. 12. *Hook. Br. Fl.* vol. ii. p. 290. *Wyatt, Alg. Danm.* no. 109. *Harv. in Mack. Fl. Hib.* part 3. p. 194. *Harv. Man.* p. 61. *J. Ag. Alg. Medit.* p. 153? *Endl. 3rd Suppl.* p. 51. *Mont. Alger.* p. 68.

Sphærococcus Palmetta, *Ag. Sp. Alg.* vol. i. p. 245. *Ag. Syst.* p. 215. *Lyngb. Hyd. Dan.* p. 11. *Spreng. Syst. Veg.* vol. iv. p. 335. *Kütz. Phyc. Gen.* p. 410.

Delesseria Palmetta, *Lamour. Ess.* p. 37.

Halymenia Palmetta, *Gaill. Dict. Sc. Nat.* vol. 53. p. 361.

Fucus Palmetta, *Esper, Ic. Fuc.* p. 84. t. 40. (*excl. syn.*) *Stack. Ner. Brit.* p. 102. t. 16. *Turn. Syn.* vol. i. p. 21. *Turn. Hist. Fuc.* t. 73. *E. Bot.* t. 1120.

Fucus bifidus, *Huds. Fl. Ang.* p. 581.

β. Nicæensis, *J. Ag. l. c.* p. 153.; frond simple, or once forked, very narrow, rising from fibres.

Hab. On rocks near the verge of low water, and at a greater depth, but more frequently on the stems of *Laminaria digitata.* Annual. Summer and autumn. Not uncommon on the British shores from Orkney to Cornwall and Jersey; more abundant in the south and west. β., at Sidmouth, *Mrs. Griffiths and Miss Cutler.*

Geogr. Distr. Atlantic shores of Europe from Norway to Spain. Mediterranean Sea. (The southern stations belong, probably, to *R. corallina.*)

Descr. *Root* a broad, common disc, sometimes accompanied by fibres. *Fronds* densely tufted, rising with a more or less evident, simple or rarely divided stem, cylindrical and filiform below, compressed above, and from a quarter of an inch to one or two inches in length: this stem gradually expands at its summit into a fan-shaped, semicircular lamina, cuneate at base, and

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more or less deeply and repeatedly cleft into numerous dichotomous, patent segments, with broad, rounded intervals, and more or less obtuse, often very obtuse apices. The lower segments are more or less cuneate, the upper mostly linear, with a perfectly flat and even, entire margin. Sometimes, especially in specimens that bear tubercles, the apices are more or less erose and jagged. In var. β. the disciform root sends out very numerous filiform, branching surculi, from whose sides spring, very irregularly, simple, or once forked, very narrow fronds, attenuated at the apex, and sometimes produced into long, filamentous cirrhi. *Tubercles* globose, seated on the margin or disc of the uppermost segments, with a wide pellucid border, and thick cellular pericarp, containing a very convex mass of angular spores. *Tetraspores* forming deep red blotches in the pale, expanded apices of the segments, cruciate or tripartite. *Colour*, a fine pinky red, preserved in drying. *Substance* membranaceous, somewhat rigid, and very imperfectly adhering to paper in drying.

This pretty species, though it varies as to the greater or less division of the frond, generally preserves a tolerably uniform, flabellate outline, which, taken in connexion with its bright pinky colour, and rather rigid, crisp substance, sufficiently distinguishes it from any British species. There are some closely allied forms in the Southern Ocean, as *R. corallina* and *R. flabelliformis*, which it is sometimes more difficult to separate. Among British plants the nearest in form is certainly *R. membranifolia* (*Chondrus membranifolius*, Grev.), but this may always be known by the very different colour, independently of differences in the fructification.

A marked difference exists between specimens which produce tetraspores, and those that bear tubercles, as may be seen by comparing our upper and lower figures. The former are invariably more expanded, with broad and rounded tips; the latter more drawn into a stem with shorter and denser segments, and truncate or abruptly cut tips.

A very remarkable variety, which bears a close resemblance to the var. β. of *Phyllophora Brodiæi*, is noticed above under the name *Nicæensis*, and represented at fig, 3. This always springs from decumbent fibres, which often acquire a considerable length. In the Mediterranean specimens the frond is usually quite simple, prolonged at the apex into a cirrhous appendage. British specimens are more commonly forked, and their apices, though attenuate, seldom produced into a tendril.

Fig. 1. Rhodymenia Palmetta: specimen with *sori* of tetraspores in the tips. 2. Specimen bearing *tubercles*. 3. Var. β.:—*all of the natural size.* 4. Apex of a segment, with sorus. 5. Cross section of the same. 6. Tetraspores. 7. Apex of a segment, with tubercles. 8. Section of a tubercle. 9. Spores:—*all more or less magnified.*

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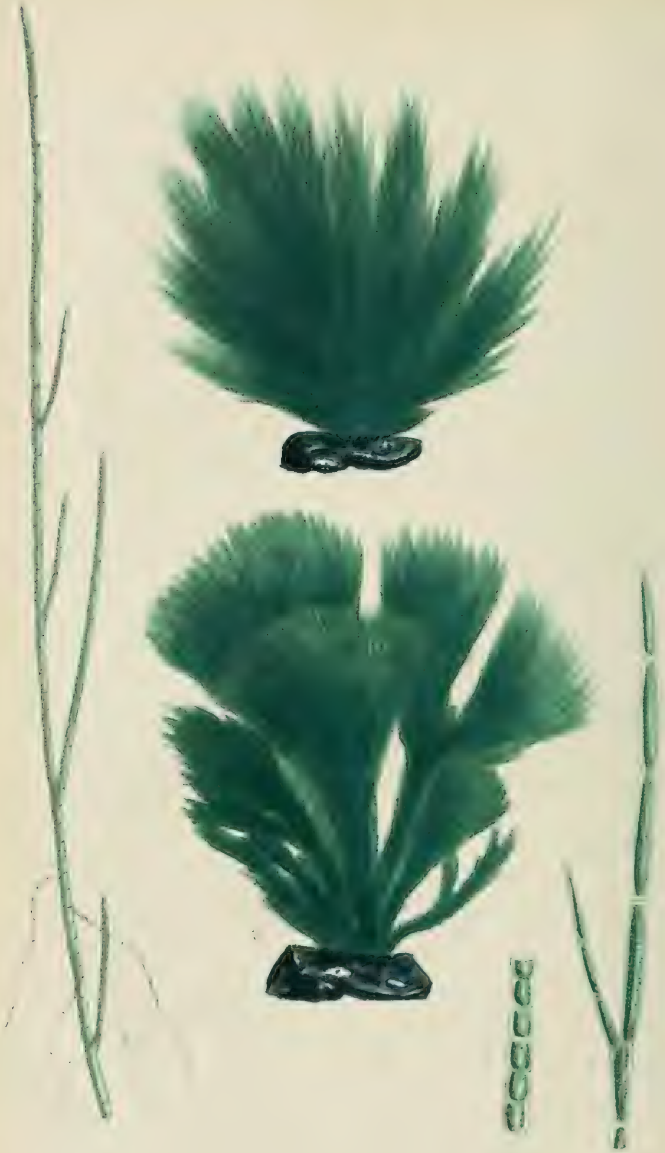

PLATE CXXXV.

CLADOPHORA ARCTA, *Kütz.*

GEN. CHAR. *Filaments* green, jointed, attached, uniform, branched. *Fruit,* aggregated granules or zoospores, contained in the joints, having at some period a proper ciliary motion. CLADOPHORA (*Kütz.*),—from κλάδος, a *branch,* and φορέω, to *bear.*

CLADOPHORA *arcta*; filaments forming broad, starry tufts, of a brilliant green colour, much branched, and more or less matted together below; branches straight, crowded, very erect; ramuli appressed, opposite or alternate, scattered; articulations in the older parts once or twice as long as broad, in the young (upper) branches many times longer.

CLADOPHORA arcta, *Kütz. Phyc. Gen.* p. 263.

CLADOPHORA vaucheriæformis, *Kütz. l. c.* p. 263.

CLADOPHORA centralis, *Kütz. l. c.* p. 269.

CONFERVA arcta, *Dillw. Conf. Suppl.* p. 67. t. E. *E. Bot.* t. 2098. *Lyngb. Hyd. Dan.* p. 157. *Ag. Syst.* p. 118. *Harv. in Hook. Br. Fl.* vol. ii. p. 359. *Harv. in Mack. Fl. Hib.* part 3. p. 230. *Harv. Man.* p. 139.

CONFERVA centralis, *Lyngb. Hyd. Dan.* p. 161. t. 56. *Ag. Syst.* p. 111. *Fl. Dan.* t. 1777. *Harv. in Hook. Br. Fl.* vol. ii. p. 358.

CONFERVA vaucheriæformis, *Ag. Syst.* p. 118.

HAB. On exposed sub-marine rocks from half-tide level to low-water mark. Perennial? Spring, summer and autumn. Frequent on the British shores from Orkney to Cornwall.

GEOGR. DISTR. Abundant on the Atlantic shores of Europe and north America. Baltic Sea. Falkland Islands, *Dr. Hooker.*

DESCR. *Tufts* rising from a spongy, cushion-like base, spreading in a circle, more or less split, in a starry manner, into several minor bundles, which are either simple or divided in a fan-like or palmate manner above. *Filaments* slender, flaccid, much branched, their lower portions more or less matted together according to age, connected by irregular, root-like fibres, which issue from the lower branches, and twine among the neighbouring filaments; branches very straight, and erect, somewhat pencillate, repeatedly divided, the lesser divisions alternate, or scattered, all very straight and erect. In young specimens, and also in those of the second season, after the new growth commences, the uppermost branches are much produced, of a very vivid green colour, and distinguished by having very long joints; at a later period these disappear, and the tufts become fastigiate, and very matted together, like a sponge. *Colour* a rich, deep green, occasionally somewhat glaucous, fading and losing much of its gloss in the herbarium. *Substance,* when young, tender and flaccid, closely adhering to paper; when old, more or less membranaceous, and very imperfectly adhering to paper.

This species has a very different aspect at different periods of its growth, and it is not without a careful examination, and watching the plant as it progresses from its infant state till it reaches maturity and gradually passes off into old age and decay, that it can be fully understood. Without such examination, I should not have ventured to unite the three synonymes here brought together, which are regarded by continental authors as distinct species; and one of which, *C. centralis*, is by Kützing considered so widely separated from the others, as to be placed in a different section of the genus. The state called *centralis*, which the lower figure in our plate may be taken to represent, does indeed differ widely in aspect from the original *arcta*, described by Dillwyn, and formerly I considered it sufficiently distinct. But a more familiar acquaintance with the plant, aided by observations made at different periods of its growth, both by Mrs. Griffiths and myself, have fully convinced me that its characters entirely depend on age, and that it is merely the fully developed state of the species. *C. vaucheriæformis*, on the other hand, is the youngest stage of growth.

Cladophora arcta abounds on all our rocky shores, and appears to be equally common throughout the Northern Atlantic. Dr. Hooker also collected it in abundance at the Falkland Islands, and very probably it is distributed as abundantly in all southern latitudes with a similar climate. I believe that it always grows upon rocks, within the range of the tide, but nearly at the limit of low water, and in such places it frequently covers a considerable surface. When young, its colour is peculiarly vivid, and its aspect silky; but as it progresses, the bright colour is more and more confined to the top branches, and the lower part of the frond becomes coarse and woolly.

The species most nearly allied to *C. arcta*, are *C. uncialis*, and *C. lanosa*, both of which are of much smaller size.

Fig. 1. CLADOPHORA ARCTA; in a young state. 2. The same, later in the season:—*both of the natural size.* 3. Portion of a filament. 4. Apex. 5. Joints from the lower part of a filament:—*all more or less magnified.*

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Plate CXXXVI

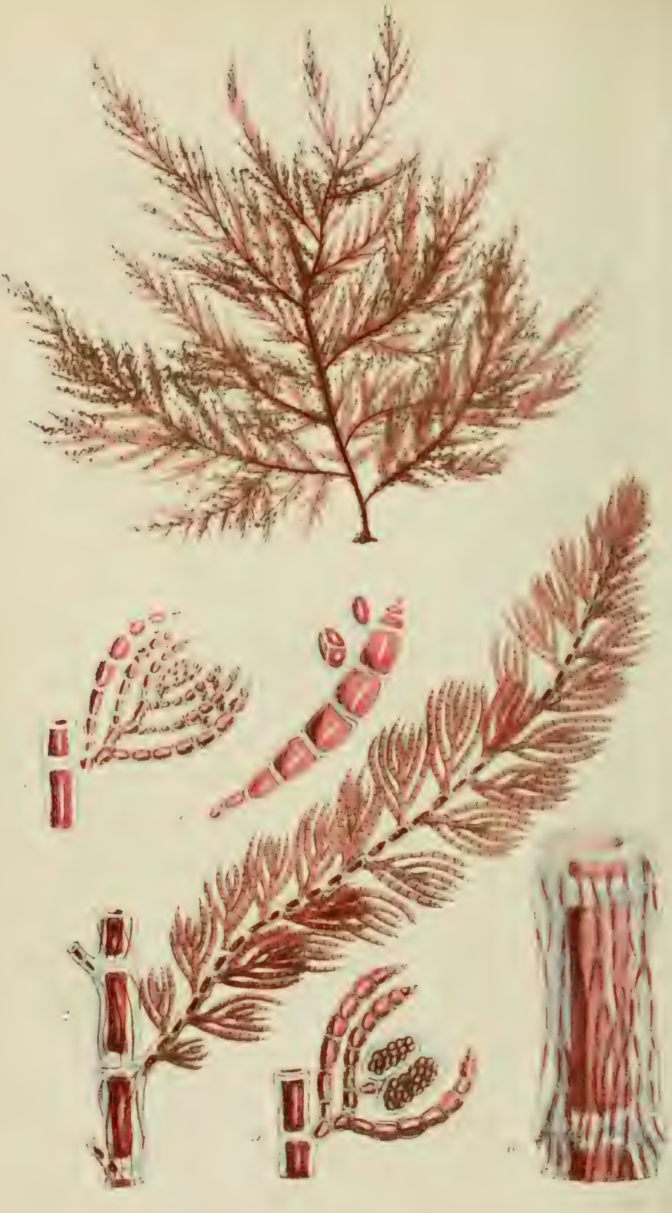

PLATE CXXXVI.

CALLITHAMNION TETRAGONUM, *Ag.*

GEN. CHAR. *Frond* rosy or brownish-red, filamentous; stem either opake and cellular, or translucent and jointed; branches jointed, one-tubed, mostly pinnate (rarely dichotomous or irregular); dissepiments hyaline. *Fruit* of two kinds, on distinct plants; 1, external *tetraspores,* scattered along the ultimate branchlets, or borne on little pedicels; 2, roundish or lobed, berry-like receptacles *(favellæ)* seated on the main branches, and containing numerous angular spores. CALLITHAMNION (*Lyngb.*),—from *κάλλις, beautiful,* and *θαμνίον,* a *little shrub.*

CALLITHAMNION *tetragonum*; outline of the frond ovate; stem cartilaginous, sub-simple, setaceous, somewhat opake, veiny, set with subquadrifarious lateral branches, furnished sometimes with a second or third series; penultimate branches pellucidly jointed, slender, elongate, set with short, alternate, patent, level-topped plumules, the lowest of which are simply pinnate, the upper sub-bi-pinnate; ramuli incurved, narrowed at the base, suddenly acuminate, their articulations once and a half a long as broad, constricted at the joints; tetraspores exceedingly minute, oval, near the tips of the ramuli.

CALLITHAMNION tetragonum, *Ag. Sp. Alg.* vol. ii. p. 176. *Harv. in Hook. Br. Fl.* vol. ii. p. 343. *Harv. in Mack. Fl. Hib.* part 3. p. 215. *Harv. Man.* p. 108. *Wyatt, Alg. Danm.* no. 90. *J. Ag. Alg. Medit.* p. 74. *Endl. 3rd Suppl.* p. 34.

CERAMIUM tetragonum, *Ag. Syst.* p. 137.

CONFERVA tetragona, *With.* vol. v. p. 405. *Dillw. Conf.* t. 65. *E. Bot.* t. 1690.

HAB. Parasitical on the larger Algæ; commonly on the fronds of *Laminaria digitata.* Annual. Summer. Shores of England and Ireland.

GEOGR. DISTR. Atlantic shores of Europe. Baltic and Mediterranean Seas.

DESCR. *Root* scutate. *Fronds* from two to five inches in length, with a broadly ovate general outline. *Stems* thicker than hog's bristle, smooth, or clothed with short hair-like ramelli, jointed, but more or less opake from the veins which traverse the articulations, subsimple, furnished throughout with numerous lateral patent, alternate, subquadrifarious, simple branches, the lowermost of which are longest. These *branches* are similar to the main stem, and bear a second or third series of lesser branches, all of which are perfectly simple. The penultimate branches are about half an inch long, pellucidly jointed, and clothed with very short plumules, set alternately. *Plumules* not half a line in length, the lowermost sub-simple or pinnate, the upper gradually more compound. *Ramuli* incurved, robust, thickest in the middle, suddenly acuminated at the point. *Articulations* of the stem and branches from two to three, or rarely four times as long as broad; those of the ramuli pretty constantly once and a half as long as their breadth. *Tetraspores* very minute, oval or oblong, sometimes transversely zoned, usually tripartite, borne near the tips of the ramuli, one or two on each ramulus.

Favellæ bi-lobed, large, formed from truncated plumules. *Colour* a brownish-red, becoming orange in fresh water, and darker in drying. *Substance* between cartilaginous and membranaceous, adhering, but not very closely, to paper in drying.

Callithamnion tetragonum, when fully grown, is one of the largest and most robust and shrubby of the British species of this charming genus, and, seen under water, is an object of much beauty. In drying, though it sufficiently retains its form, it loses considerably in elegance, from the pressing together of the delicate quadrifarious ramuli, which in a state of nature stand out from the branchlets, giving to the different parts of the frond a roundness, without confusion, or matting together of the minutest part. These, in dried specimens, become confounded together. Its most frequent habitat is on the stems and margins of the laciniæ of *Laminaria digitata*, which it frequently fringes in the most beautiful manner; but it is by no means confined to this species, being often seen on some of the smaller Algæ, as on *Codium tomentosum*, *Chondrus crispus* and others. It rapidly changes colour in fresh water, assuming a brilliant orange tint, and giving out a rose-coloured powder. Though a species of large size, its *tetraspores* are exceedingly small, much smaller in proportion than those of most other species, and, being borne near the tips of the smaller and more crowded ramuli may easily escape detection. The *favellæ*, on the contrary, are of large size, and easily seen.

C. tetragonum appears to be of common occurrence on the shores of Europe, and very probably extends to the opposite side of the Atlantic. It is very closely, perhaps too closely, allied to *C. brachiatum*, Bonnem., which I have, therefore, figured on the following plate, that the distinctions may be more readily seen.

Fig. 1. CALLITHAMNION TETRAGONUM:—*the natural size.* 2. Penultimate branch, set with plumules. 3. A plumule, bearing tetraspores. 4. Ramulus from the same. 5. A plumule bearing favellæ. 6. Joints of one of the main branches, to show the veining:—*all more or less magnified.*

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Plate CXXXVII

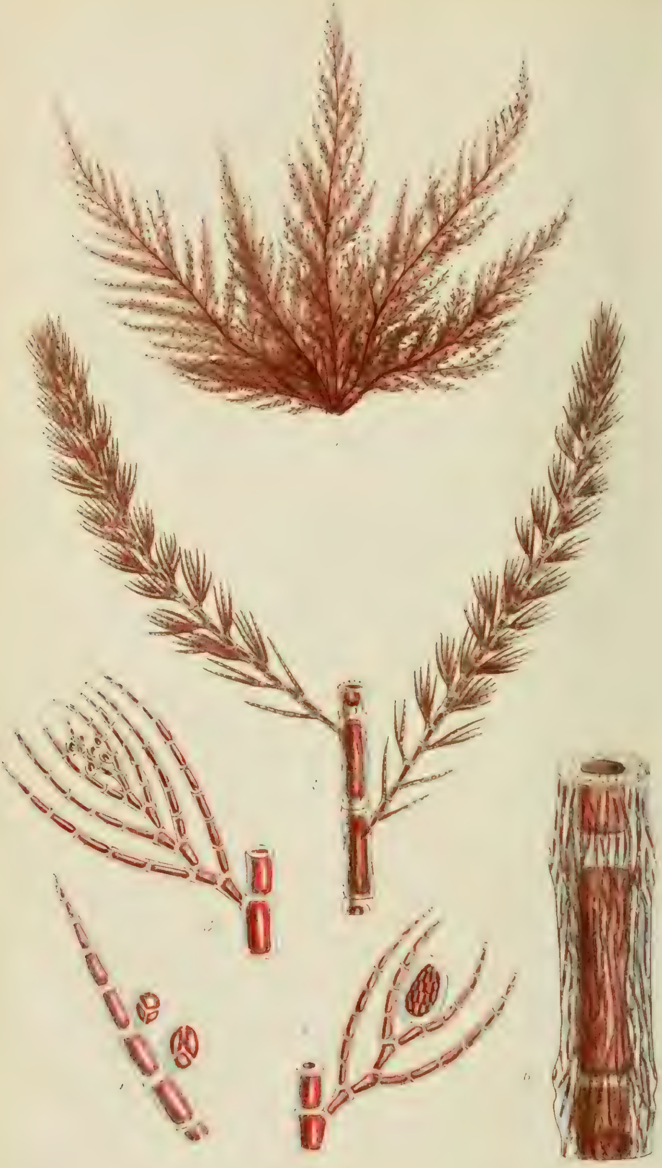

PLATE CXXXVII.

CALLITHAMNION BRACHIATUM, *Bonnem.*

GEN. CHAR. *Frond* rosy, or brownish-red, filamentous; *stem* either opake and cellular, or translucent and jointed; branches jointed, one-tubed, mostly pinnate (rarely dichotomous or irregular); dissepiments hyaline. *Fruit* of two kinds, on distinct plants: 1, external *tetraspores,* scattered along the ultimate branchlets, or borne on little pedicels; 2, roundish or lobed, berry-like receptacles *(favellæ),* seated on the main branches, and containing numerous, angular spores. CALLITHAMNION (*Lyngb.*),—from κάλλις, *beautiful,* and θαμνίον, a *little shrub.*

CALLITHAMNION *brachiatum*; outline of the frond lanceolate; stem cartilaginous, subsimple, setaceous, somewhat opake, veiny, set with subquadrifarious, lateral branches, often furnished with a second series; penultimate branches pellucidly jointed, slender, elongate, set with short, alternate, very erect, level-topped plumules, the lowermost of which are most simple; ramuli erect, subulate, not narrowed at base, gradually tapering to a fine point, their articulations twice as long as broad, cylindrical; tetraspores minute, oval, near the tips of the ramuli.

CALLITHAMNION brachiatum, *Bonnem.* (*sec. Lenorm. in Herb.*)

CALLITHAMNION Harveyanum, *J. Ag. in Linn.* XV. p. 45. *Endl. 3rd Suppl.* p. 34.

CALLITHAMNION granulatum, *Harv. in Br. Fl.* vol. ii. p. 334 (*not of Agardh*). *Harv. in Mack. Fl. Hib.* part 3. p. 215.

HAB. Parasitical on the larger Algæ, frequently on *Laminaria digitata, Codium tomentosum,* &c. Staffa, *Capt. Carmichael.* Orkney, *Rev. J. H. Pollexfen; Messrs. Thomas* and *M'c Bain.* Torbay and Ilfracombe, *Mrs. Griffiths.* West of Ireland, *W.H.H.* Jersey, *Miss Turner.* Probably general, but frequently confounded with *C. tetragonum.*

GEOGR. DISTR. Atlantic shores of Europe.

DESCR. *Root* scutate. *Fronds* densely tufted, from two to four inches long, with a lanceolate general outline. *Stems* simple, distinctly jointed throughout but veiny, smooth, furnished from the base with numerous closely-set, alternate, subquadrifarious, erecto-patent lateral branches, of which those toward the middle of the stem are longest, the upper ones gradually decreasing. These are commonly simple, but in larger specimens bear a second series of lesser branches. Penultimate branches from a quarter to half an inch long, erecto-patent, subquadrifarious, set with alternate, very erect plumules in their upper part, below with simple or once forked subulate ramuli; plumules subsimply pinnate, level-topped, their pinnules very erect, subulate, not narrowed at base, perfectly cylindrical and gradually tapering to a fine point, somewhat incurved. *Tetraspores* small, elliptical, borne on the uppermost pinnules, near their tips. *Favellæ* simple, or bilobed, at the apices of shortened plumules. *Articulations* of the main stem from twice to thrice or four times as long as broad; of the ramuli about twice as long as broad. *Colour* a brownish-red, purplish when dry. *Substance* between cartilaginous and membanaceous, adhering to paper.

I here figure a plant which in the 'British Flora' I had incorrectly referred to *C. granulatum*, Ag., a species which I now know to be much more nearly allied to our *C. spongiosum*. In the 'Manual', I have been content to regard the present as merely a slender variety of *C. tetragonum*, with which it is very commonly confounded, and which it resembles in most of its essential characters, and in general aspect can hardly be distinguished, except on a close inspection. My friend Professor J. Agardh, however, has judged differently, and done me the honor of giving it my name, in which he has been followed by Endlicher, in his useful Synopsis. My attention is thus again directed to the subject, and I have deemed it best to give a figure in which all the characters by which it differs from *C. tetragonum* being depicted, botanists may form their own opinion as to the validity of its claims to rank as a species. I should have adopted the specific name of Agardh, had I not received from M. Lenormand specimens, exactly similar to our British ones, bearing a name conferred by Bonnemaison, which, I believe, has priority to that proposed by Agardh, though at present I am not aware where it has been published.

The character by which *C. brachiatum* appears *essentially* to differ from *C. tetragonum*, is to be found in the ultimate ramuli, which in this are constantly subulate, gradually tapering from the base to the apex; and in that are suddenly acuminate, or, as it were, *mucronate*. This is what originally induced me to admit the species, which I found indicated in the unpublished 'Algæ Appinenses' of Carmichael, under the name *C. fruticulosum*; and so far as my observations have gone, this character appears to be constant. Minor and less important distinctions may be taken from the length of the joints, and their *form*, which is cylindrical in the present species and oval in *C. tetragonum*. Both plants are equally common, and found in the same situations.

Fig. 1. CALLITHAMNION BRACHIATUM:—*of the natural size*. 2. Penultimate branches. 3. A plumule, bearing tetraspores. 4. Apex of a fertile pinnule. 5. A plumule bearing a favella. 6. Joint of a main branch or of the stem:—*all magnified*.

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Plate CXXXVIII

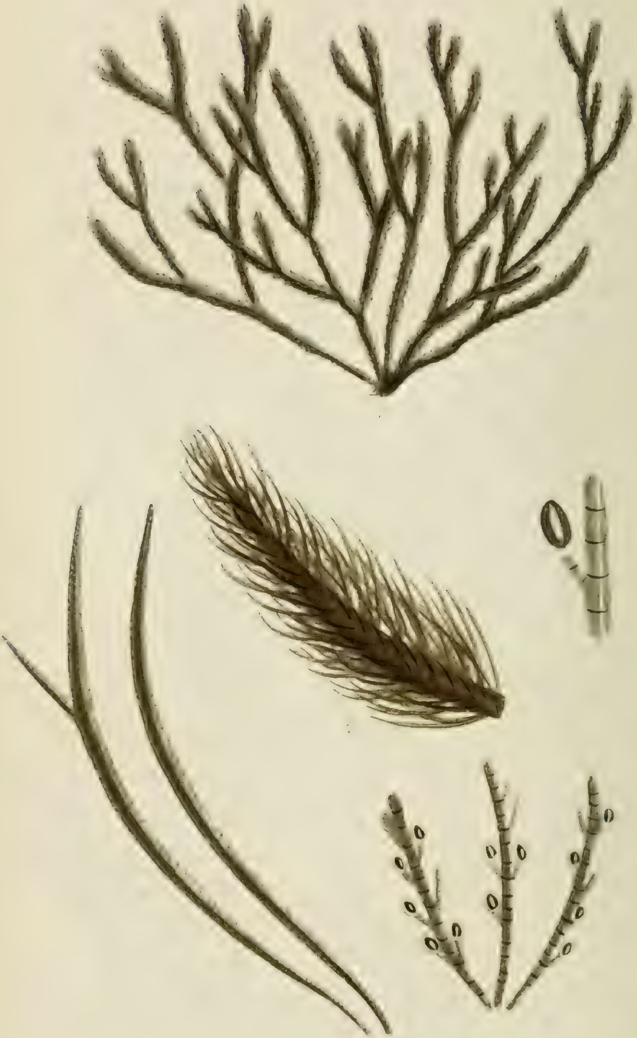

PLATE CXXXVIII.

CLADOSTEPHUS SPONGIOSUS, *Ag.*

GEN. CHAR. *Fronds* inarticulate, rigid, cellular, whorled with short, jointed, subsimple ramuli. *Fructification*; ellipticle utricles, furnished with a limbus, pedicellate, borne on accessory ramuli. CLADOSTEPHUS (*Ag.*),—κλαδος, a *branch*, and στεφος, a *crown*.

CLADOSTEPHUS *spongiosus*; branches thick and clumsy; ramuli mostly simple, sometimes forked, irregularly whorled and densely imbricated.

CLADOSTEPHUS spongiosus, *Ag. Syst.* p. 168. *Ag. Sp. Alg.* vol. ii. p. 12. *Harv. in Hook. Br. Fl.* vol. ii. 322. *Harv. in Mack. Fl. Hib.* part 3. p. 180. *Harv. Man.* p. 36. *Wyatt, Alg. Danm.* no. 169. *J. Ag. Alg. Medit.* p. 30. *Endl. 3rd Suppl.* p. 24.

CLADOSTEPHUS laxus, *Fl. Dan.* t. 1955. f. 3. (?) *excl. syn.*

CONFERVA spongiosa, *Huds. Fl. Ang.* p. 596. *Lightf. Fl. Scot.* p. 983. *With.* vol. iv. p. 132. *Dillw. Conf.* t. 42. *E. Bot.* t. 2427. fig. 1.

FUCUS hirsutus, *Linn. Mant.* p. 134. *Esper*, t. 28.

HAB. On rocks and stones in the sea, between tide marks, and at a greater depth. Perennial. Winter. Common on the shores of the British Islands.

GEOGR. DISTR. Atlantic shores of Europe and North America. Mediterranean Sea. Cape Horn, *Dr. Hooker.*

DESCR. *Root* discoid. *Fronds* from three to four inches high, thicker than bristle, irregularly branched, or somewhat dichotomous, the branches flexuous, patent, thickened here and there, more or less divided, and densely clothed throughout with short jointed setaceous ramelli *Ramelli* from half a line to a line in length, incurved, simple, or with a forked point, attenuated at the base, acute, densely crowded together in very close whorls. These ramelli are more or less deciduous in winter, at which season the frond is covered with others of less size, straighter, and perfectly obtuse, which produce the fructification. This consists of stalked, elliptical utricles, or spores, disposed along the sides of the ramelli, and either opposite to each other or irregularly scattered. Joints of the ramelli shorter than broad, dotted, composed of several layers of minute cells. *Colour* dull brown, or dirty olive green. *Substance* of the stem woody. It does not in the least adhere to paper in drying.

Cladostephus spongiosus, the earliest described species of the genus, differs from *C. verticillatus,* already figured at Pl. XXXIII., of our first volume, more by its smaller size, more clumsy and somewhat flexuous branches, and more closely imbricated ramelli, than by any more definite character. The distinction in the ramelli, noticed in the specific phrase by most authors, is not constant, for these are often forked in the present species, though more usually simple. The colour is darker than that of *C. verticillatus*, and, on the whole, the present is a much less elegant plant. The accessory ramelli, which constitute the *Sphacelaria Bertiana* of Italian writers, are found on this species equally as on *C. verticillatus*. The figure of Dillwyn which represents ovate capsules, discharging spores through a terminal pore, appears to be incorrect; at least, I have never seen anything similar in the multitudes of specimens which have passed through my hands.

C. spongiosus is a very common plant throughout the northern Atlantic, growing on rocks and stones between tide marks, and is also found in the Baltic and Mediterranean Seas. Dr. Hooker collected specimens at Hermite Island, Cape Horn, which offer no character by which they can be distinguished from individuals of British growth.

Fig. 1. Cladostephus spongiosus:—*of the natural size.* 2. Apex of one of the branches. 3. Ramelli. 4. Fertile ramelli, produced in winter. 5. Spore or utricle, *in situ*:—*all more or less magnified.*

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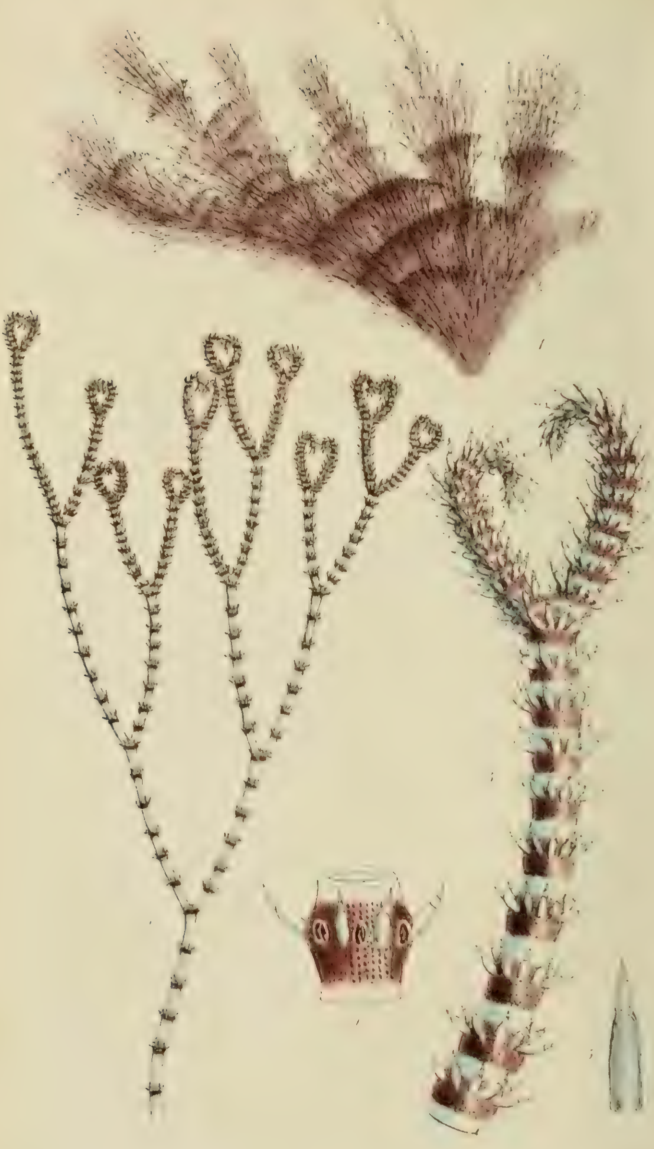
Plate CXXXIX



Reeve, imp.

PLATE CXXXIX.

CERAMIUM CILIATUM, *Ducluz.*

GEN. CHAR. *Frond* filiform, one-tubed, articulated; the dissepiments coated with a stratum of coloured cellules, which sometimes extend over the surface of the articulation. *Fructification* of two kinds, on distinct individuals; 1, *tetraspores,* either immersed in the ramuli, or more or less external; 2, sessile, roundish *receptacles* (*favellæ*), having a pellucid limbus, containing minute, angular spores, and subtended by one or more short, involucral ramuli. CERAMIUM (*Roth.*),—from κεραμος, a *pitcher,* but the fruit is not pitcher-shaped.

CERAMIUM *ciliatum*; frond slender, of nearly equal diameter throughout, rigid, repeatedly dichotomous, with or without lateral branchlets, fastigiate, the apices strongly involute; articulations pellucid, those of the middle of the stem from three to four times longer than broad, the upper gradually shorter; dissepiments coloured, furnished with a whorl of robust, subulate, three-jointed prickles; tetraspores alternating with the prickles; favellæ subtended by two or three ramuli.

CERAMIUM ciliatum, *Ducluz. Ess.* p. 64. *Lyngb. Hyd. Dan.* p. 121. t. 37. *Ag. Sp. Alg.* vol. ii. p. 153. *Hook. Fl. Scot.* part 2. p. 14. *Grev. Fl. Edin.* p. 311. *Harv. in Hook. Br. Fl.* vol. ii. p. 336. *Harv. in Mack. Fl. Hib.* part 3. p. 211. *Harv. Man.* p. 100. *Wyatt, Alg. Danm.* no. 180. *J. Ag. Alg. Medit.* p. 81. *J. Ag. Advers.* p. 26. *Mont. Fl. Algier.* p. 145.

CERAMIUM diaphanum, var. ciliatum, *Duby, Bot. Gall.* p. 967. *Ag. Syst.* p. 134.

ECHINOCERAS ciliatum, *Kütz. in Linn.* vol. xv. p. 736. *Kütz. Phyc. Gen.* p. 380.

BORYNA ciliata, *Gratel. Bory, Dict. Class. Fl. Pelop.* p. 77.

CONFERVA ciliata, *Ellis, Phil. Trans.* vol. lvii. p. 425. t. 18. fig. *h. H.* *Huds. Fl. Ang.* p. 599. *Lightf. Fl. Scot.* p. 998. *With. Br. Pl.* vol. iv. p. 137. *Dillw. Conf.* p. 77. t. 53. *E. Bot.* t. 2428.

CONFERVA pilosa, *Roth. Cat. Bot.* vol. ii. p. 225. t. 5. f. 2.

HAB. On rocks and stones in the sea, either in tide pools or exposed at low water; also attached to Corallines and other Algæ. Annual. Summer. Not uncommon on the British shores, from Orkney to Cornwall.

GEOGR. DISTR. Dispersed throughout the Atlantic and Pacific Oceans, in temperate latitudes of the northern and southern hemisphere.

DESCR. *Fronds* forming dense tufts, from three to six inches in diameter, as fine as human hair, nearly of equal diameter throughout, rigid, harsh and rather brittle, repeatedly dichotomous, occasionally furnished with lateral dichotomous branchlets, fastigiate; the *apices* strongly hooked inwards; *axils* rather patent. *Articulations* colourless, those of the lower parts of the filaments several times longer than broad, of the upper branches gradually shorter, and the uppermost joints extremely short. *Dissepiments* coated with a broad, coloured band of minute cellules, more or less clearly defined, furnished with a regular whorl of robust, subulate, colourless prickles, composed of three cells or joints, the lowest joint being twice as long as the other two; the uppermost very small and acute. *Tetraspores* not very prominent, disposed in a whorl round the joint, alternately with the prickles. *Favellæ*, according to Dillwyn, "roundish, lateral, nearly sessile, and mostly accompanied by three or four, short, incurved ramuli". *Colour* of the tufts a purplish-red. *Substance* membranaceous and rigid, imperfectly adhering to paper in drying.

Under the common name *ciliatum* at least three distinct varities of *Ceramium*, now regarded as distinct species, have hitherto been confounded by British botanists. These I have brought together in the present number for the purpose of contrasting their characters. The excellent figures published by Ellis, and Dillwyn, and the descriptions given by those authors, leave us at no loss to decide to which of the three modern species their synonyme belongs. They appear to have had the present species solely in view. In Herbaria, on the contrary, the three are very frequently confounded together, and even in the excellent work of Mrs. Wyatt, specimens of *C. echionotum* are published in some of the copies, as *C. ciliatum*.

It is but just to state that my accurate friend Mrs. Griffiths has for many years been convinced of the distinctness of these plants and separated them in her own rich collection; and one of them was also well distinguished by the late Capt. Carmichael. To the naked eye they have very much the same appearance, and to the touch the same peculiarly harsh feel, and it is not till we submit small portions to the test of the microscope that their differences are perceived. Obvious differences may then be observed in the spines, with which the joints are armed, and these appear to be constant.

Fig. 1. CERAMIUM CILIATUM; tuft, *of the natural size*. 2. Portion of a filament. 3. Apex of the same. 4. A joint with tetraspores. 5. A prickle:—*all more or less highly magnified.*

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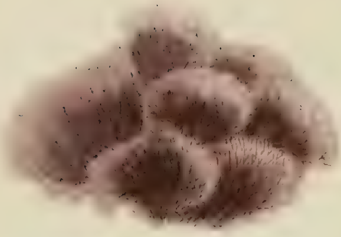
Plate CXI



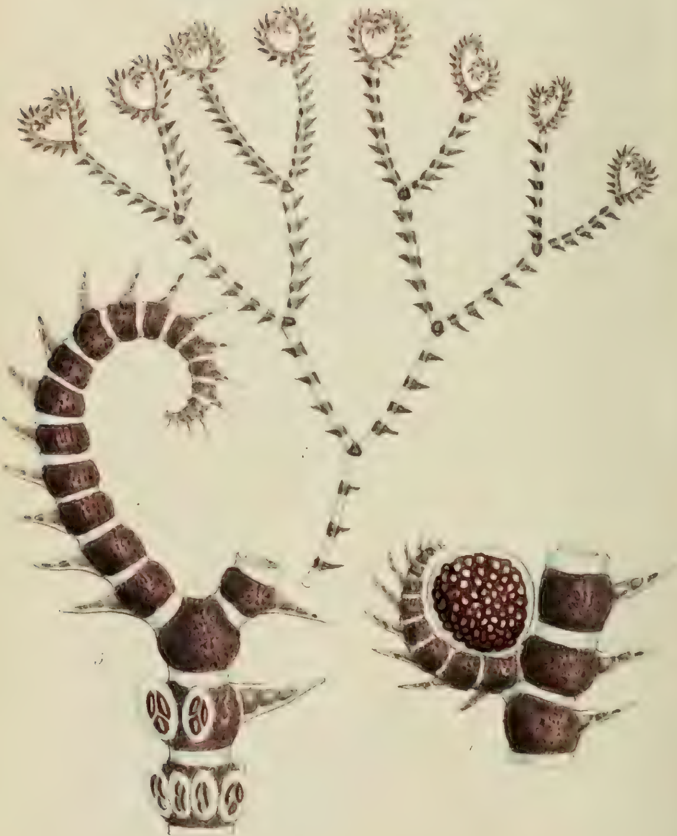


PLATE CXL.

CERAMIUM ACANTHONOTUM, *Carm.*

GEN. CHAR. *Frond* filiform, one-tubed, articulated; the dissepiments coated with a stratum of coloured cellules, which sometimes extend over the surface of the articulation. *Fructification* of two kinds, on distinct individuals; 1, *tetraspores*, either immersed in the ramuli, or more or less external; 2, sessile, roundish *receptacles* (*favellæ*), having a pellucid limbus, containing minute, angular spores, and subtended by one or more short, involucral ramuli. CERAMIUM (*Roth*),—from κεραμος, a *pitcher*, but the fruit is not pitcher-shaped.

CERAMIUM *acanthonotum*; frond slender, of nearly equal diameter throughout, rigid, repeatedly dichotomous, fastigiate, the apices strongly involute; articulations pellucid, those of the middle of the stem several times longer than broad, the upper gradually shorter; dissepiments coloured, armed on the outer edge with a single robust, broadly subulate, coloured, three-jointed prickle; tetraspores erumpent, whorled round the joint; favellæ roundish, subtended by a solitary, incurved ramulus.

CERAMIUM acanthonotum, *Carm. Alg. Appin. ined. cum ic. J. Ag. Advers.* p. 26.

CERAMIUM ciliatum, β. acanthonotum, *Harv. in Hook. Br. Fl.* vol. ii. p. 336. *Harv. Man.* p. 100.

ACANTHOCERAS Shuttleworthianum, *Kütz. in Linn.* t. 15. p. 739. *Kütz. Phyc. Gen.* p. 381. t. 46. f. 4.

HAB. On exposed rocks, near low-water mark, and on the smaller Algæ. Annual. Summer and autumn. Not uncommon. Appin, *Capt. Carmichael.* Aberdeen, *Dr. Dickie.* Torbay, *Mrs. Griffiths,* Plymouth, *Messrs. Hore and Rohloff.* Common in the west of Ireland, *W.H.H.* Youghal, *Miss Ball.*

GEOGR. DISTR. The British Islands.

DESCR. *Fronds* very densely tufted, when old forming intricate and often matted bunches, from two to six inches in diameter, slender, about as thick as human hair, of equal diameter throughout, excessively divided dichotomously and more or less furnished with lateral dichotomous branchlets; in old specimens these latter become in their turn repeatedly divided, and, issuing along the whole of the lower parts of the frond, serve to render the tufts so compact and closely matted, as they eventually become. *Axils* patent in all parts of the frond; *apices* strongly rolled inwards. *Articulations* colourless, cylindrical, those of the lower parts of the stem several times longer than broad; the upper gradually shorter, and the ultimate ones extremely short, many times shorter than broad. *Dissepiments* coated with a broad, deeply coloured, well-defined band of minute, angular cellules; each with a solitary, robust, coloured, three-jointed, broadly subulate, or deltoid, very acute prickle on its outer margin. *Tetraspores* very large, with broad pellucid pericarps, erumpent from the joint, whorled. *Favellæ* globose, lateral, subtended by a single, strongly incurved ramulus. *Colour* of the tufts dark purple. *Substance* rigid, imperfetly adhering to paper.

Ceramium acanthonotum was first distinguished by the late Capt. Carmichael, of Appin, in whose unpublished 'Algæ Appinenses' an excellent description and accurate figure are given. It is my fault that in the 'British Flora', and subsequent works, it appears only in the rank of a variety. Later observations, on several of our shores, and comparison of numerous specimens, from various quarters, have long since convinced me that it is a true species. Its colour is much darker than that of *C. ciliatum*, often an intense purple; and the tufts are usually shorter, and more densely compacted. These characters, however, are not sufficiently definite, and an appeal to the microscope may be necessary. This at once displays the admirable character by which the species may be recognized, namely, the *solitary*, three-jointed spine, arming the outer margin of every joint. The only other known British *Ceramium* which has a spine at all similar, is *C. flabelligerum*, but that is at once distinguished by its joints being coloured, not hyaline; not to speak of its very different branching, and the smallness of its spine.

Kützing, in his revision of the genus *Ceramium*, divides the species into six distinct genera, one of which he founds on the present individual, which he distinguishes generically from other ciliated *Ceramia* because its tetraspores are erumpent. As some of my readers may desire to know the *characters* attributed to this author's genera, they are here given.

Hormoceras. Frond jointed; cortical cells collected at the dissepiments in transverse zones; tetraspores immersed. (*C. diaphanum and its allies; thirteen species enumerated.*)

Gongroceras. Frond jointed; cortical cells collected at the dissepiments in transverse zones; tetraspores erumpent. (*C. Deslongchampsii, and five others.*)

Echinoceras. Frond jointed, zoned and aculeated at the joints; tetraspores immersed. (*C. ciliatum, and nine others.*)

Acanthoceras. Frond jointed, zoned and aculeated at the joints; tetraspores erumpent. (*C. acanthonotum.*)

Ceramium. *Frond* filiform, consisting of a jointed central axis, and a cortical, continuous layer of cells, destitute of cilia or spines; tetraspores immersed in the cortical layer. (*C. rubrum., &c.*)

Centroceras. Frond as in *Ceramium*, but furnished at the joints with prickles or spikes; tetraspores erumpent. (*C. clavulatum, and five others.*)

Fig. 1. Ceramium acanthonotum:—*tuft of the natural size.* 2. Portion of a filament. 3. Small part of the same, with *tetraspores*. 3. Small portion of a filament, with a *favella, in situ*:—*all more or less magnified.*

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Plate CXII

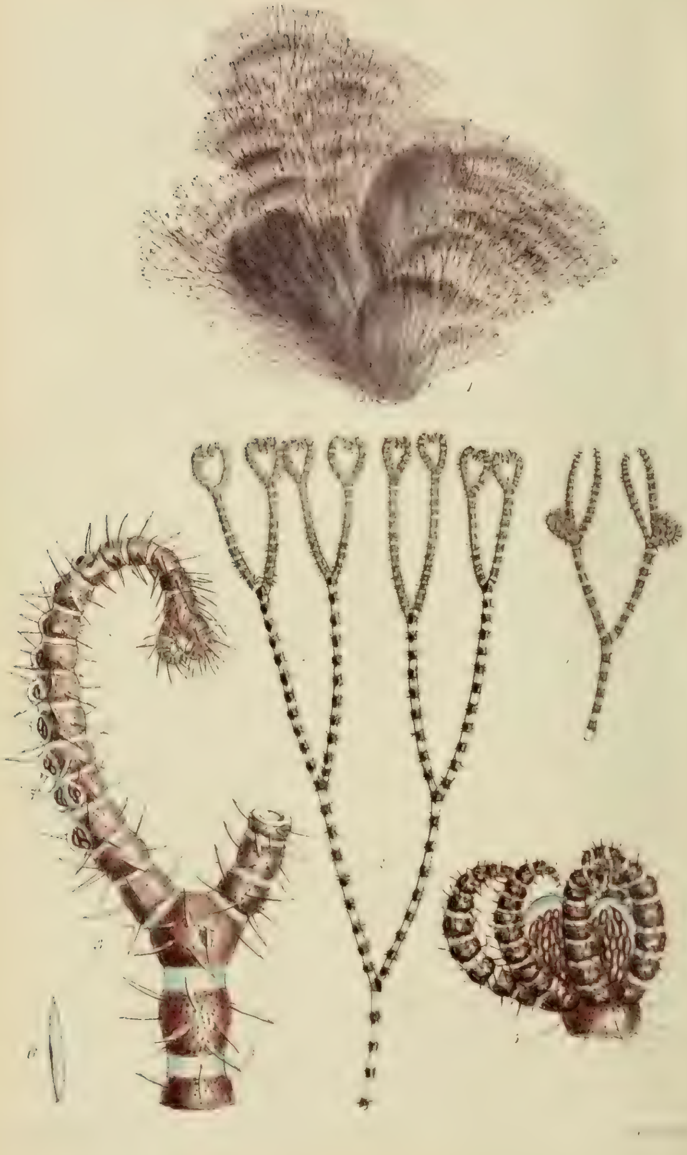

PLATE CXLI.

CERAMIUM ECHIONOTUM, *J. Ag.*

GEN. CHAR. *Frond* filiform, one-tubed, articulated; the dissepiments coated with a stratum of coloured cellules, which sometimes extend over the surface of the articulation. *Fructification* of two kinds, on distinct individuals; 1, *tetraspores,* either immersed in the ramuli, or more or less external; 2, sessile, roundish *receptacles* (*favellæ*), having a pellucid limbus, containing minute, angular spores, and subtended by one or more short, involucral ramuli. CERAMIUM (*Roth.*)—from κεραμος, a *pitcher,* but the fruit is not pitcher-shaped.

CERAMIUM *echionotum*; frond slender, of nearly equal diameter throughout, rigid, repeatedly dichotomous, frequently with lateral forked branchlets, fastigiate, the apices more or less involute; articulations pellucid, those of the middle of the stem three or four times longer than broad, the upper gradually shorter, the uppermost extremely short; dissepiments coloured, armed with numerous, slender, irregularly inserted, subulate, colourless, one-jointed prickles; tetraspores mostly solitary in each joint, erumpent, along the outer margin of the filament; favellæ mostly bilobed, lateral, subtended by numerous, strongly incurved ramuli.

CERAMIUM echionotum. *J. Ag. Advers.* p. 27.

HAB. On rocks and stones, between tide marks; and in tidal pools parasitic on various Algæ. Annual. Summer and autumn. Common in several places. Torbay *Mrs. Griffiths.* Plymouth, *Messrs. Hore* and *Rohloff.* Youghal, *Miss Ball.* North of Ireland, *Mr. W. Thompson.* West of Ireland, *W.H.H.*

GEOGR. DISTR. Coasts of Europe, both Atlantic and Mediterranean.

DESCR. *Fronds* capillary, densely tufted, three to six inches long, harsh and rigid to the touch, of nearly equal diameter throughout or slightly attenuated upwards, many times dichotomous, frequently furnished with lateral, repeatedly forked, short branchlets, fastigiate. *Axils* patent in all parts of the frond. *Apices* more or less strongly hooked inwards. *Articulations* at first filled with a pale pink fluid, at length colourless, cylindrical, those of the lower part of the frond several times longer than broad, the upper gradually shorter. *Dissepiments* coated with a broad, clearly defined band of minute coloured cellules, armed with more or less numerous, irregularly inserted, slender, brittle, acicular, colourless, one-jointed prickles. *Tetraspores* confined to the outer edge of the filament, one, or rarely two, in each dissepiment, prominent, with wide pericarps. *Favellæ* generally near the apices of the frond, or of the lateral ramuli, often placed in the fork, and subtended by an involucre formed of several, involute ramuli. *Colour* of the tufts, a more or less deep purplish-red. *Substance* rigid, imperfectly adhering to paper.

Mrs. Griffiths has for many years regarded the plant here figured, as being distinct from *C. ciliatum*, from which the nature and disposition of the prickles that clothe the joints in greater or less number at once distinguish it. In *C. ciliatum* there is a regular whorl of stout three-jointed prickles, all pointing upwards, round the centre of every joint; here we have several slender, one-jointed, needle-shaped prickles scattered irregularly and pointing in various directions like the spines of a sea-urchin, a resemblance which appears to have suggested the specific name under which Professor Agardh has described it. In young specimens the joints, at least the upper ones, are filled with a purplish fluid which makes the frond, while living, appear to be fully coloured, not diaphanous; when dried this fluid is dispersed and the true nature of the joint is obvious. Specimens from different quarters differ in some minor points, and possibly more than one species may still be confounded under this name, but the subject is one of great difficulty, and requires considerable observation of the living plant, during its whole course of growth.

Fig. 1. CERAMIUM ECHIONOTUM; a tuft, *of the natural size*. 2. Upper portion of a filament. 3. Apex, with tetraspores *in situ*. 4. Portion of a filament with involucres. 5. Involucre containing a bilobed *favella*. 6. A prickle.

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Plate CXLII.

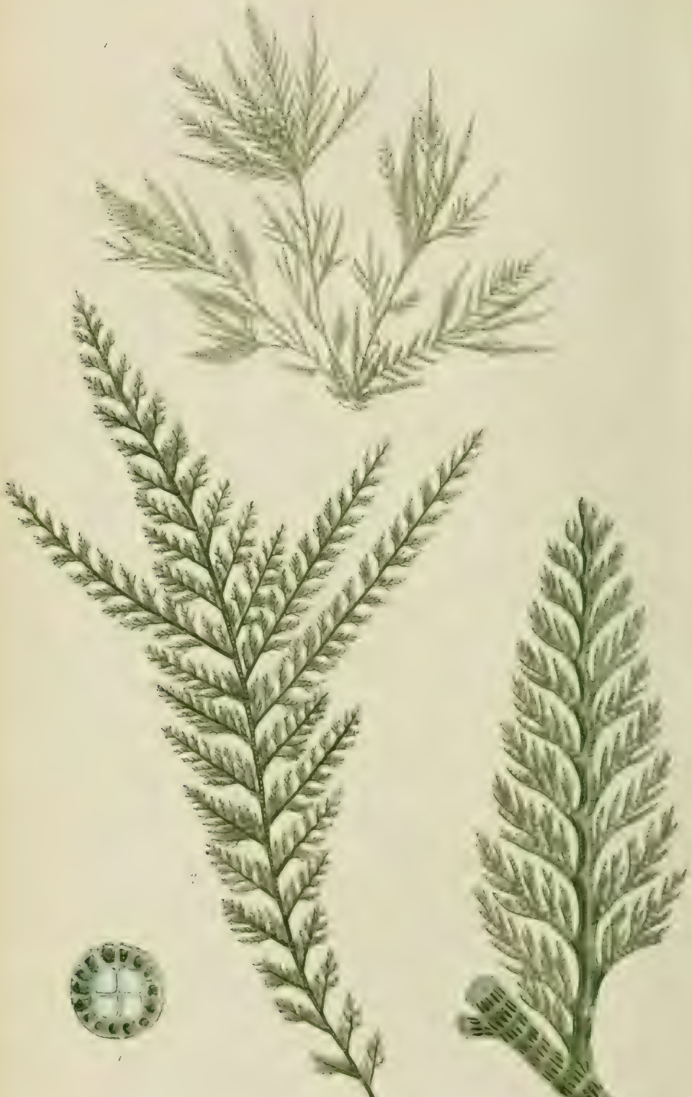

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PLATE CXLII.

SPHACELARIA FILICINA, *Ag.*

GEN. CHAR. *Filaments* jointed, rigid, distichously branched, pinnated; rarely simple or subdichotomous. *Apices* of the branches distended, membranous, containing a dark granular mass. *Fructification*; elliptical *utricles* (or *spores*) furnished with a limbus, borne on the ramuli. —SPHACELARIA (*Lyngb.*), σφάκελος, *gangrene,* alluding to the withered tips of the branches.

SPHACELARIA *filicina*; frond shaggy at the base, slender, irregularly branched; branches lanceolate, erecto-patent, bi-tri-pinnate; pinnæ alternate, erect; pinnules multifid, lanceolate; axils all very acute and narrow.

SPHACELARIA filicina, *Ag. Syst.* p. 166. *Ag. Sp. Alg.* vol. ii. p. 22. *Harv. in Hook. Br. Fl.* vol. ii. p. 323. *Mont. Crypt. Alg.* no. 24. *Menegh. Alg. Ital. et Dalm.* p. 324. *Harv. Man.* p. 37. *J. Ag. Alg. Medit.* p. 30. *Endl. 3rd. Suppl.* p. 23. *Mont. Fl. Alg.* p. 41. *Wyatt, Alg. Danm.* n. 170.

SPHACELARIA hypnoides, *Grev. Scott. Crypt. Fl.* t. 348.

SPHACELARIA simpliciuscula, *Ag. Sp. Alg.* vol. ii. p. 31.

HALOPTERIS filicina, *Kütz. Phyc. Gen.* p. 292.

CERAMIUM filicinum, *Gratel. Journ. Med.* vol. iv. p. 33.

HAB. On rocks and nullipores near low-water mark, and at the roots of *Laminaria,* &c. Very rare. Perennial. Fruiting in Winter. Plymouth, *Mr. Sconce.* Ilfracombe, *Mrs. Griffiths* and *Mrs. Hare.* Salcombe, *Mrs. Wyatt.* Jersey, *Miss Turner* and *Miss White.* Mount's Bay, Cornwall; and Holyhead, Anglesea, *Mr. Ralfs.* Belfast Bay, *Mr. W. Thompson.* Youghal, *Miss Ball.* Kinsale Harbour, *Dr. J. R. Harvey.*

GEOGR. DISTR. Atlantic shores of France and Spain. Mediterranean Sea.

DESCR. *Fronds* two to four inches high, slender, more or less clothed at the base with curled brown fibres, irregularly and sparingly divided; branches distichous, erect, often bearing at their summit numerous lesser branches displayed like a fan; sometimes naked, sometimes regularly pinnated throughout. *Branches* linear-lanceolate in outline, the uppermost and lowermost pinnæ generally shorter, those in the middle longer, with now and then two or three of much greater length than those immediately adjoining. *Pinnæ* alternate, erecto-patent, bi-pinnate, or tri-pinnate below, with two pinnules constantly given off from the upper side of the rachis before any issue from the lower side. *Pinnules* issuing at every second joint, very erect, at first simple and subulate, afterwards pinnato-multifid, their ultimate divisions subulate and appressed. *Fructification* produced on the young pinnules while yet simple, a single obovate *spore* forming in the axil of the pinnule. *Articulations* half as long as broad, multi-striate; the striæ less evident in the younger parts of the frond. A cross section of the stem shows four large central cells, destitute of endochrome, surrounded by numerous, coloured cellules. *Colour* a more or less greenish olive. *Substance* rigid, scarcely adhering to paper.

There are few more beautiful plants among the filiform Algæ of our coasts, and not many more rare than the subject of this plate, which, though found in several distant localities is no where abundant in Britain. It is, indeed, a species of the south of Europe which finds its northern limit in our seas, where it does not reach much more than half the size that it attains in the Mediterranean. Specimens from the shores of Italy are nearly as large and bushy as *S. scoparia*, but much more slender in all their parts. Our British individuals, except those from Jersey, are so feeble, and have so different an aspect, that Dr. Greville, who first figured them in his beautiful Cryptogamic Flora, regards them as belonging to a different and peculiar species, which he calls *S. hypnoides*. A careful comparison with numerous continental specimens from various quarters has led me to an opposite conclusion, the differences appearing to me to be merely such as may be fairly referred to climate. The Mediterranean specimens of *Grateloupia filicina* are quite as unlike the British ones as those of the Mediterranean *Sphacelaria filicina* are to ours. There is no difference in the microscopic characters of the ramuli, or in their disposition, if the specimens have respectively been collected at the same season. Between the winter and summer states of this species, however, the differences are so great, that Agardh formerly constituted them two species, his *S. simpliciuscula*, which has its pinnules subsimple, being the winter state of *S. filicina*. A similar difference between the summer and winter appearance of *S. scoparia* has already been pointed out. Indeed, so great is the variableness of aspect which specimens at different ages present, among the *Sphacelariæ*, that, as Meneghini well remarks, the greatest caution should be exercised by authors who propose new species; and the plants should be watched in their place of growth from their first appearance to maturity. But this is often no easy matter, especially with such rare plants as the present. Since our plate has been prepared Miss Turner has communicated from Jersey a magnificent specimen, fully as large as one from the south of Europe, and covered with fructification. I regret that it is too late to add a representation of the spore to the analysis already given.

Fig. 1. SPHACELARIA FILICINA:—*the natural size*. 2. A branch. 3. A pinna. 4. Cross section of the stem.

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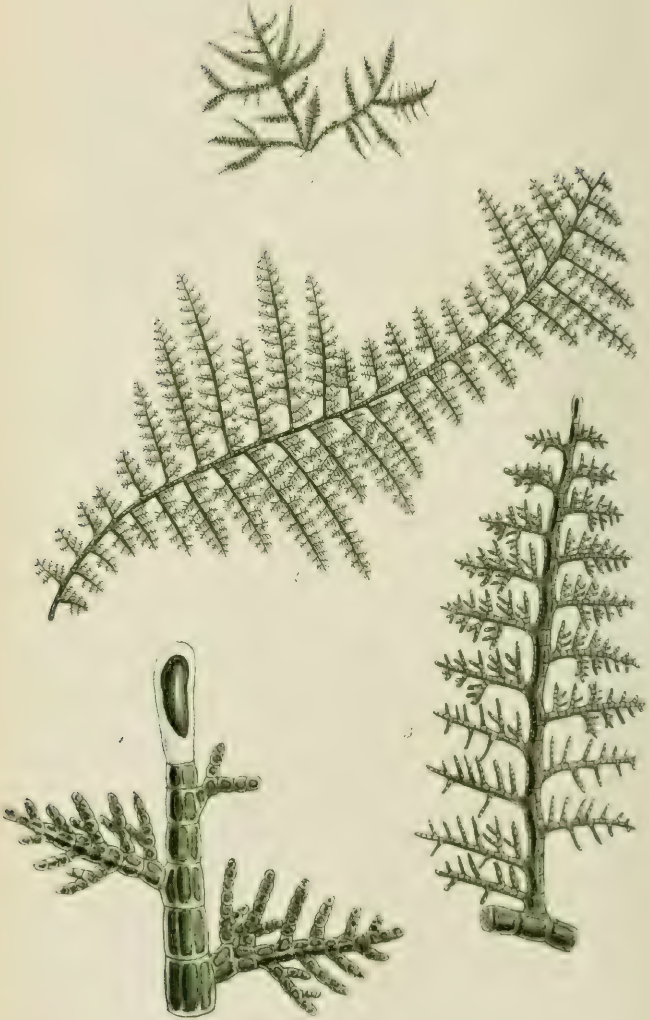

Reeve, imp.

PLATE CXLIII.

SPHACELARIA SERTULARIA, *Bonnem.*

GEN. CHAR. *Filaments* jointed, rigid, distichously branched, pinnated; rarely simple or subdichotomous. *Apices* of the branches distended, membranous, containing a dark, granular mass. *Fructification*; elliptic *utricles* (or *spores*) furnished with a limbus, borne on the ramuli. SPHACELARIA (*Lyngb.*),—from σφεκαλος, *gangrene*, alluding to the withered tips of the branches.

SPHACELARIA *Sertularia*; frond slightly shaggy at the base, weak and slender, irregularly branched; branches somewhat lanceolate or linear horizontally patent, tripinnate; pinnæ alternate, divaricate; pinnules very patent, multifid; axils all very obtuse and wide.

SPHACELARIA Sertularia, *Bonnem. sec. Lenorm. in Herb.*

SPHACELARIA filicina β. patens, *Harv. Man.* p. 37.

HAB. Parasitical on various Algæ, in from four to fifteen fathoms water. Very rare. Perennial. Brighton Beach, *Mr. Borrer*. Torbay, and other places on the South Coast, *Mrs. Griffiths*. Isle of Wight, *Miss Kirkpatrick*. Jersey, *Miss H. M. White*. Carrickfergus, *Mr. M'Calla*. Roundstone Bay, *W.H.H.*

GEOGR. DISTR. Atlantic shores of France, South of England, and Ireland.

DESCR. *Fronds* about an inch, rarely two inches high, very slender, growing in irregular, somewhat matted patches or tufts, among the branches of other Algæ, more or less connected at base by curled brown fibres, more or less regularly pinnate, or somewhat naked below and producing at the apex numerous branches spreading like a fan. *Branches* linear, linear-lanceolate, or oblong, closely tripinnate throughout, the pinnæ very unequal in length, long and short ones sometimes alternating; at other times most of the central pinnæ are of equal length, those near the top and bottom being much shorter. *Pinnæ* horizontally patent, alternate, bipinnate below, more or less tripinnate above, the two lowermost pinnæ given off from the upper side of the rachis before any issue from the lower. *Pinnules* issuing at every second joint, horizontally patent or divaricate, pinnato-multifid, their ultimate divisions linear, obtuse, patent. *Articulations* about as long as broad, 3–4-striate, the striæ less numerous in the younger parts; the ultimate ramuli mono-siphonous. *Colour* an olive-green. *Substance* rigid, scarcely adhering to paper. The apices of the branches are frequently much produced, sphacelate, containing a dark coloured granular mass.

It is, I allow, with some hesitation that I offer a figure of the present plant as anything more than a deep-water variety of *Sphacelaria filicina*, analogous to somewhat similar varieties of several other Algæ, individuals of which, when growing at a more than ordinary depth differ as much from their normal state, and in a very similiar manner, as the present does from *S. filicina*. Persons accustomed to dredging must be familiar with states of *Plocamium coccineum, Dasya coccinea*, &c., which are more slender than the normal form, irregularly branched, with very patent branches and ramuli, and which are usually found entangled with other Algæ, to which they are attached by hooked processes, different from their true roots. The plant here figured has always appeared to me to be a similiar state of *S. filicina*, nor am I yet convinced that it ought to be regarded as any thing more. Other observers are, however, of a different opinion, and among them Mrs. Griffiths, who has repeatedly gathered both plants, and considers the constantly parasitic habit of the *S. Sertularia*, its small size, and very patent branching, to afford sufficient distinctions. In the plate here given I have taken pains to represent all these characters in sufficient detail to be readily contrasted with *S. filicina* figured in the last plate, and having done so I must submit the decision to the judgment of my fellow students. At any rate there are quite differences enough to constitute an excellent "*cabinet species*".

I am not aware in what work Bonnemaison has published this plant. My knowledge of his synonyme is due to M. Lenormand who has obligingly communicated a specimen from the north of France under the name here adopted, and who informs me that it is frequently cast on the French coast entangled with the uncinate variety of *Plocamium coccineum*.

Fig. 1. SPHACELARIA SERTULARIA; *of the natural size*. 2. A branch. 3. A pinna. 4. Apex of a pinna, with some of the smaller pinnules.

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Plate CXLIV

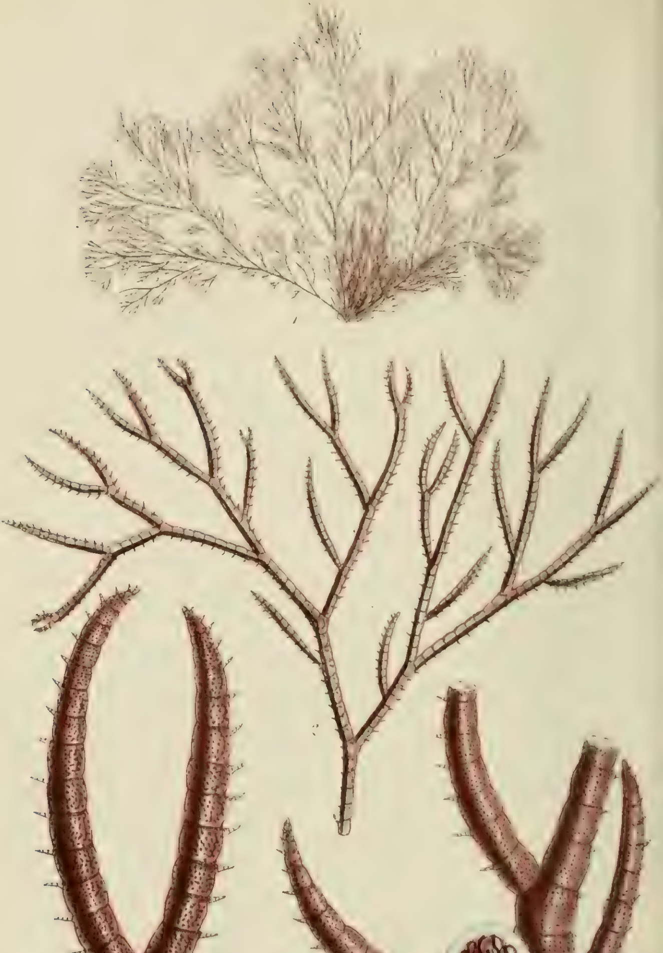

PLATE CXLIV.

CERAMIUM FLABELLIGERUM, *J. Ag.*

GEN. CHAR. *Frond* filiform, one-tubed, articulated; the dissepiments coated with a stratum of coloured cellules, which sometimes extend over the surface of the articulation. *Fructification* of two kinds, on distinct individuals; 1, *tetraspores*, either immersed in the ramuli or more or less external; 2, sessile, roundish *receptacles* (*favellæ*), having a pellucid limbus, containing minute, angular spores, and subtended by one or more short, involucral ramuli.—CERAMIUM (*Roth*), from κεραμος, a *pitcher*, but the fruit is not pitcher-shaped.

CERAMIUM *flabelligerum*; frond subsetaceous, attenuated upwards, rigid, flabellately branched, irregularly dichotomous, with lateral forked ramuli, the apices acute, patent or somewhat incurved; articulations coated with coloured cellules, those of the lower branches about twice as long as broad, of the upper equal in length and breadth, each armed on the outer edge with a single, minute, subulate, coloured, three-jointed prickle; tetraspores erumpent, whorled round the joint; favellæ two- or three-lobed, berry-like, subtended by several patent, subulate ramuli.

CERAMIUM flabelligerum, *J. Ag. Advers.* 27.

HAB. Parasitical on the smaller Algæ between tide marks. Annual. Summer and Autumn. Rare. Torbay, *Mrs. Griffiths.* Jersey, *Miss. H. M. White.*

GEOGR. DISTR. South of England. Coast of Spain; at Cadiz, *Cabrera.*

DESCR. *Fronds* more or less densely tufted, but not matted together, from two to three inches high, nearly as thick as hogs' bristle below, becoming gradually more slender upwards, and towards the apex as fine as human hair, divided in an irregularly dichotomous manner, distichous, the main divisions having a more or less fan-shaped outline, but not strictly fastigiate, repeatedly forked; the upper branches furnished with more or less numerous, minute, simple or forked, lateral ramuli from one to two lines in length, erecto-patent, somewhat constricted at base, acute and attenuate at the point. *Axils* patent in all parts of the frond. *Apices* generally spreading, sometimes slightly incurved, but never hooked inwards. *Articulations* tolerably uniform, those of the lower part of thestem from once and a half to twice as long as broad, of the upper branches and ramuli about equal in length and breadth, all coated with a stratum of minute, coloured cells, opake, slightly contracted at the dissepiment and there furnished on the outer margin with a single, minute, horizontally patent, subulate, three-jointed prickle. *Tetraspores* large, tri-partite, with wide pericarps, erumpent, whorled round the joints. *Favellæ* dispersed along the sides of the upper branches, consisting of two or more rounded, berry-like lobes, with wide pericarps, containing numerous large granules; the cluster surrounded by several, longish, patent, spindle-form, involucral ramuli. *Colour* a dull red. *Substance* somewhat cartilaginous, not closely adhering to paper.

The external habit of this species is so different from that of the other ciliated *Ceramia* that it can scarcely be confounded with any of them. It bears a much closer resemblance to a small specimen of *C. rubrum*, to which species there is much similarity both in the branching and in the length and structure of the joints; but from which it may be at once distinguished under the microscope by the minute prickle with which each of the joints is armed at its outer edge. I believe that it was first discriminated by Mrs. Griffiths, who communicated specimens to Professor J. Agardh, from whom it received the name here adopted. It is by no means common, nor have I seen any British specimens except those collected by Mrs. Griffiths, and some for which I am indebted to Miss White, who gathered them in Jersey. Professor Agardh has obligingly sent me a specimen from the coast of Spain, which has all the essential characters of the British plant. Perhaps the most nearly allied species to *C. flabelligerum* is *C. monile*, a native of Tasmania, whose joints are armed with similar prickles, but the general branching of the frond and its size are very different.

Fig. 1. CERAMIUM FLABELLIGERUM:—*the natural size*. 2. Part of the filament. 3. Apex of a filament, bearing *tetraspores*. 4. Portion of a filament, with *favellæ* and involucral ramuli. 5. A prickle.

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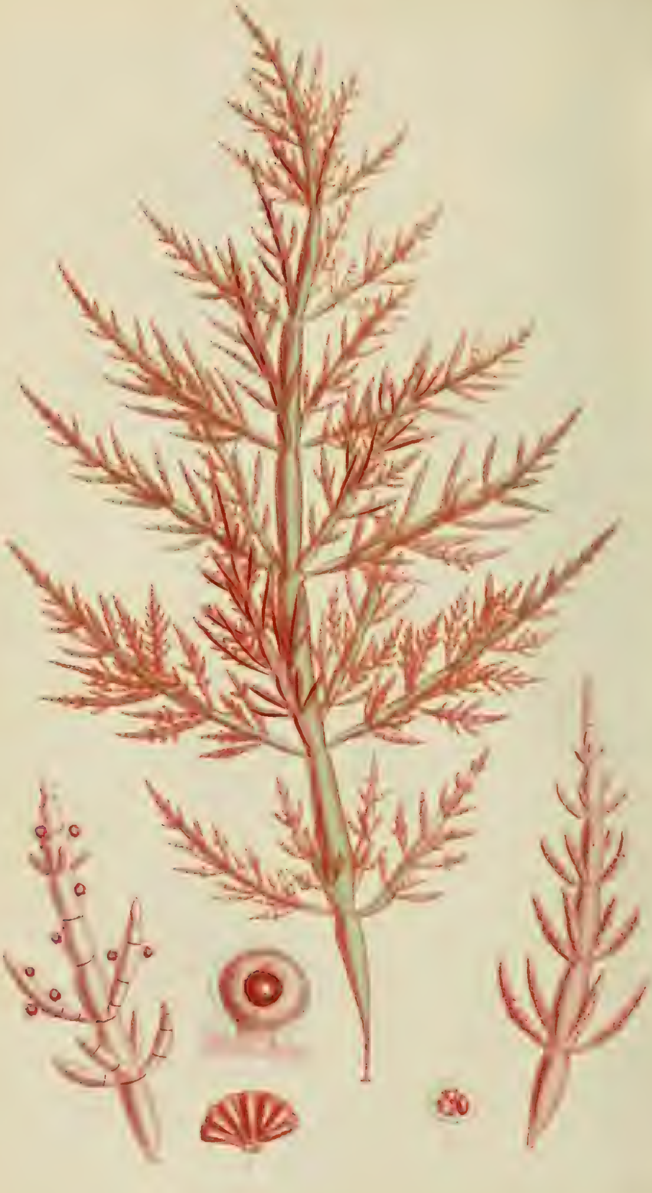

PLATE CXLV.

CHYLOCLADIA KALIFORMIS, *Hook.*

GEN. CHAR. *Frond* (at least the branches) tubular, constricted at regular intervals, and divided by internal diaphragms into joints, filled with a watery juice, and traversed by a few longitudinal filaments; periphery composed of small, polygonal cells. *Fructification* of two kinds, on distinct individuals; 1, spherical, ovate, or conical *capsules* (*ceramidia*) containing a tuft of wedge-shaped spores on a central placenta; 2, tripartite *tetraspores*, immersed in the smaller branches, near their apices. CHYLOCLADIA (*Grev.*)—from χυλος, *juice*, and κλαδος, a *branch.*

CHYLOCLADIA *kaliformis*; frond subgelatinous, tubular, pyramidal; main stem simple, distended, distantly constricted; branches opposite or whorled, repeatedly compound; ramuli moniliform; capsules spherical, with a pellucid border.

CHYLOCLADIA kaliformis, *Hook. Br. Fl.* vol. ii. p. 397. *Harv. in Mack. Fl. Hib.* part 3. p. 199. *Harv. Man.* p. 72. *Wyatt, Alg. Danm.* n. 24. *J. Ag. Alg. Medit.* p. 111.

LOMENTARIA kaliformis, *Gaill. Res.* p. 20. *Endl.* 3*rd Suppl.* p. 43. *Kütz. Phyc. Gen.* p. 440. t. 55. f. 3. *Zanard, Alg. Adr.* p. 97. *Mont. Fl. Alg.* p. 88.

GASTRIDIUM KALIFORME, *Lyngb. Hyd. Danm.* p. 70. *Grev. Alg. Brit.* p. 117.

CHONDRIA kaliformis, *Ag. Sp. Alg.* vol. i. p. 355. *Ag. Syst.* p. 207. *Spreng. Syst. Veg.* vol. iv. p. 342. *Hook. Fl. Scot.* part 2. p. 106.

GIGARTINA kaliformis, *Lamour. Ess.* p. 49.

FUCUS kaliformis, *Good. and Woodw. in Linn. Trans.* vol. iii. p. 206. t. 18. *Sm. Eng. Bot.* t. 640. *Turn. Syn.* p. 377. *Turn. Hist.* t. 29.

FUCUS verticillatus, *Lightf. Fl. Scot.* p. 962. t. 31.

β. *patens*; frond flexuous, much attenuated; branches opposite, horizontal, flexuous, drawn out into long slender points; ramuli setaceous, opposite or alternate.

LOMENTARIA patens, *Kütz. Phyc. Gen.* p. 440.

γ. *squarrosa*; frond crisped and entangled, variously curved; branches densely whorled; ramuli very numerous, whorled, squarrose or arching, slender.

LOMENTARIA squarrosa, *Kütz. Phyc. Gen.* p. 440. t. 55. f. 4.

HAB. On rocks and stones in the sea, between tide marks, and in from four to fifteen fathoms water. Annual. Spring and Summer. Var. β. and γ. in deep land-locked, sandy or muddy bays. Var. β. Strangford Lough, *Mr. W. Thompson.* Carrickfergus, *Mr. M'Calla.* Var. γ. Roundstone Bay, *Mr. M'Calla.* Torbay, *Mrs. Griffiths.*

GEOGR. DISTR. Northern Atlantic. Baltic and Mediterranean Seas.

Descr. *Root* minute, scutate. *Fronds* from six to twelve or twenty inches in length, from the thickness of a crow-quill to that of a goose-quill in diameter, rising with a simple stem, which is distended and constricted at intervals of half an inch or an inch, furnished, at each constriction, with a whorl of branches similar to itself in structure, and, in full grown specimens, several times compounded in a similar manner. The general outline is pyramidal, the lowermost branches being longest, the uppermost gradually shorter. *Branches* spreading, more regularly constricted than the stem and at shorter intervals, furnished with whorls of more or less frequently compounded ramuli, the ultimate series of which are constricted into bead-like joints, mostly about as long as broad. *Capsules* globose, without obvious pore, furnished with a wide pellucid pericarp, and containing a dense tuft of pear-shaped spores. *Tetraspores* lodged in the joints of the ramuli. *Substance* gelatinoso-membranous, closely adhering to paper in drying. *Colour* a fugitive pink or purple, often greenish or yellowish in the stem, and, when growing in shallow pools, exposed to strong light, sometimes altogether pale yellow. Var. β. is much less compound, mostly with opposite (*not whorled*) branches, which are drawn out into long, flexuous, slender points, and furnished with a few distant slender ramuli. Var. γ. is the opposite state, forming densely matted tufts, closely whorled, with more numerous branches and ramuli to each whorl, the latter patent or curved backwards.

A well-known plant, common to most of the shores of Europe, and found growing at various depths from about half-tide level to some fathoms below low water mark. Like most species which have a wide range of climate, and which grow at various depths, sometimes on rock, sometimes on sand, and sometimes on the stems of other Algæ, it is subject to very great variations both in size and in the minor details of its branching. Our figure represents what may be considered its normal state, or type of the species, being a young plant growing under favourable circumstances near low water mark. This differs very widely in appearance from either of the deep water varieties, which are briefly characterized as our vars. β. and γ.; and yet few persons who are accustomed to the different aspects which marine plants assume from local causes will be disposed to regard them as anything more than casual forms. As *cabinet species* they appear distinct enough, especially β. whose attenuated branches and almost setaceous ramuli, *opposite*, not *whorled*, seem to mark it decidedly. I have specimens of it from the Baltic and Mediterranean; the latter communicated by Professor Kützing, who regards it, as well as our var. γ., as a distinct species.

Fig. 1. Chylocladia kaliformis, a small specimen:—*of the natural size.* 2. Branchlet with *capsules*. 3. A *capsule*. 4. Portion of the tuft of spores. 5. Branchlet with tetraspores. 6. A tetraspore.

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Plate XVII

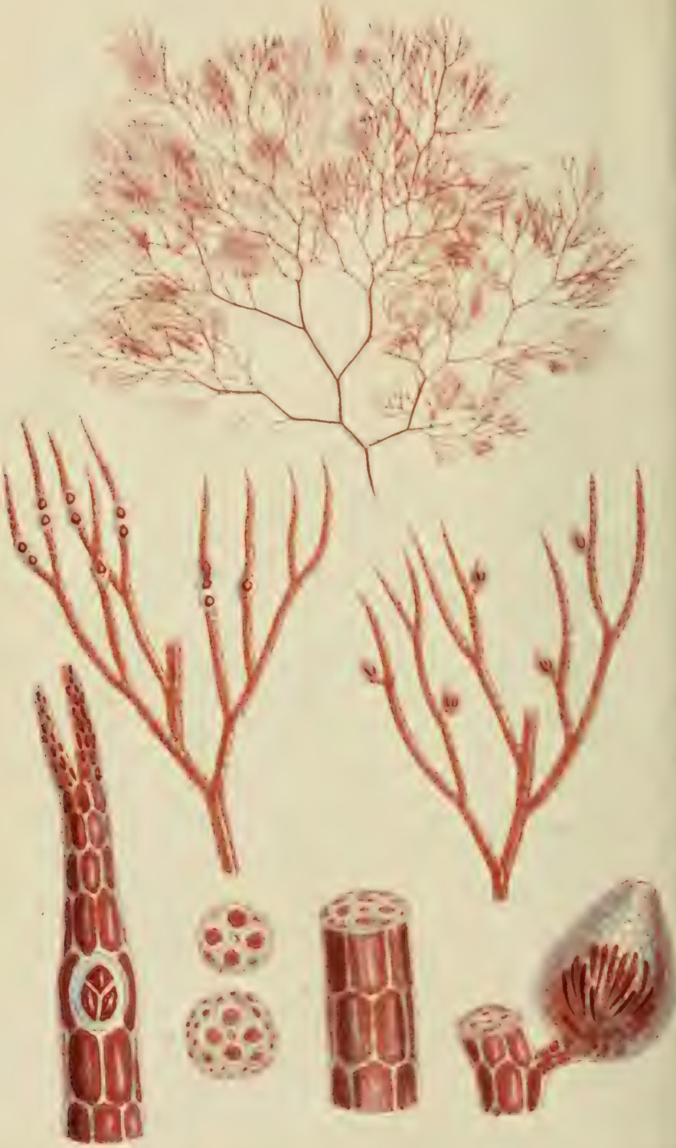

PLATE CXLVI.

POLYSIPHONIA ELONGELLA, *Harv.*

GEN. CHAR. *Frond* filamentous, partially or generally articulate; joints longitudinally striate, composed of numerous radiating cells or tubes disposed round a central cavity. *Fructification* two-fold, on different individuals; 1, ovate *capsules* (*ceramidia*), furnished with a terminal pore, and containing a mass of pear-shaped spores; 2, *tetraspores* imbedded in swollen branchlets. POLYSIPHONIA (*Grev.*), — from *πολυς*, *many*, and *σιφων*, a *tube*.

POLYSIPHONIA *elongella*; filaments setaceous and rigid below, gradually attenuated upwards, irregularly dichotomous, with very patent axils; upper branches flaccid, more or less furnished with lateral, pencilled, multifid, rose or blood-red ramuli; articulations of the branches about as long as broad, those of the ramuli rather longer, both marked with 2–3 broad, parallel, oblong cells; primary tubes four, surrounding a minute cavity, and encompassed with an external coat of small cells; capsules ovate, on a short stalk; dissepiments pellucid.

POLYSIPHONIA elongella, *Harv. in Hook. Br. Fl.* vol. ii. p. 334. *Harv. Man.* p. 96. *Wyatt, Alg. Damn.* no. 84. *J. Ag. Alg. Medit.* p. 135. *Endl. 3rd Suppl.* p. 45. (n. 30).

HAB. On rocks and stones, and on the smaller Algæ, near low-water mark and at a greater depth. Biennial. Spring and Summer. Rather rare. Sidmouth and Torbay, *Mrs. Griffiths* and *Miss Cutler*. Devonport, *Rev. W. S. Hore.* Jersey, *Miss. H. M. White.* Orkney, *Rev. J. H. Pollexfen.* Ardrossan, *Rev. D. Landsborough.* Dublin Bay, *Miss Ball.* Howth, *Miss. Gower.* Killiney, *Mrs. Appjohn.* Belfast Bay, *Dr. Drummond* and *Mr. Thompson.* Larne, *Mr. D. Moore.* Malahide, *Mr. M'Calla.*

GEOGR. DISTR. Coast of France, *Lenormand.* Adriatic Sea, *J. Agardh.*

DESCR. *Fronds* from two to four or five inches high, solitary or slightly tufted, as thick as hogs' bristle below, cartilaginous and firm, gradually attenuated and becoming flaccid and tender upwards, divaricately or very patently branched, more or less regularly dichotomous, the axils, especially the lower ones, very wide and obtuse. Upper branches elongate, flexuous, alternately divided, and furnished with lateral, multifid, pencilled ramuli, which are more or less dense on different specimens. These ramuli are excessively tender and flaccid, and of a more or less intense sanguineous-red: late in the season they fall away, leaving naked spine-like branchlets. *Articulations* clearly visible in all parts of the frond, the dissepiments being pellucid; lower articulations shorter than their breadth, those of the branches about equal in length and breadth, those of the ramuli rather longer, but rapidly diminishing toward the apices. A transverse section of the lower part of the stem shows four large *primary* tubes, arranged in a cruciform manner round a minute central cavity, and surrounded by two or three rows of cells, gradually smaller outwards; a section of a branch has four similar primary tubes, surrounded by a very narrow coating of cells. *Capsules* large, ovate, on short slender stalks. *Tetraspores* immersed in the ramuli. *Colour* of the stem dark red, of the ramuli vivid. The upper branches adhere closely to paper in drying, the lower part of the frond very imperfectly.

The winter and summer aspects of a deciduous tree are not more different from each other than are specimens of this beautiful plant collected at opposite seasons. Our figure represents it when in perfection, as it is in spring and in the early months of summer, when its branches are clothed with abundant pencils of delicate rosy or blood-red ramuli. At a later period of the year these fall away, and the specimens collected in September or October are usually quite bare, the larger branches only remaining; and these in their nakedness and rigidity, with broken points and spine-like divaricating branches, have little resemblance to the plant of summer. Such specimens as survive the winter throw out with returning spring fresh pencils of branchlets, even in greater profusion than the first year. Such is also the case with *P. elongata*, which our *P. elongella* strongly resembles in miniature, but from which it may readily be known by the pellucid articulations visible in all parts of the plant, and by the ramuli not tapering to the base. Robust specimens of *P. variegata* have a habit very similiar to the present species, but may always be distinguished to the eye by their purple colour, and under the microscope, by the different structure of the joints which in *P. elongella* have but four principal tubes; in *P. variegata* six, or sometimes seven.

P. elongella is one of the many species the discovery of which is due to Mrs. Griffiths, from whose specimens it was described in the British Flora in 1832. Since that period it has been detected on several parts of our coasts, as well as on the Atlantic coast of France, and in the Adriatic Sea. Its nearest affinity is, perhaps, with *P. breviarticulata*, a Mediterranean species.

Mr. Pollexfen's specimen from Orkney, differs from the usual form in being more distichous, and less zigzag in its branching; but as there is no character in its joints to distinguish it further, I am disposed to regard it as a local variety.

Fig. 1. POLYSIPHONIA ELONGELLA:—*of the natural size*. 2. Branchlet with tetraspores. 3. Apex of the same. 4. Branchlet with capsules. 5. A capsule. 6. Portion of the stem. 7. Transverse section of a branch. 8. Similar section of the stem:—*all more or less magnified*,

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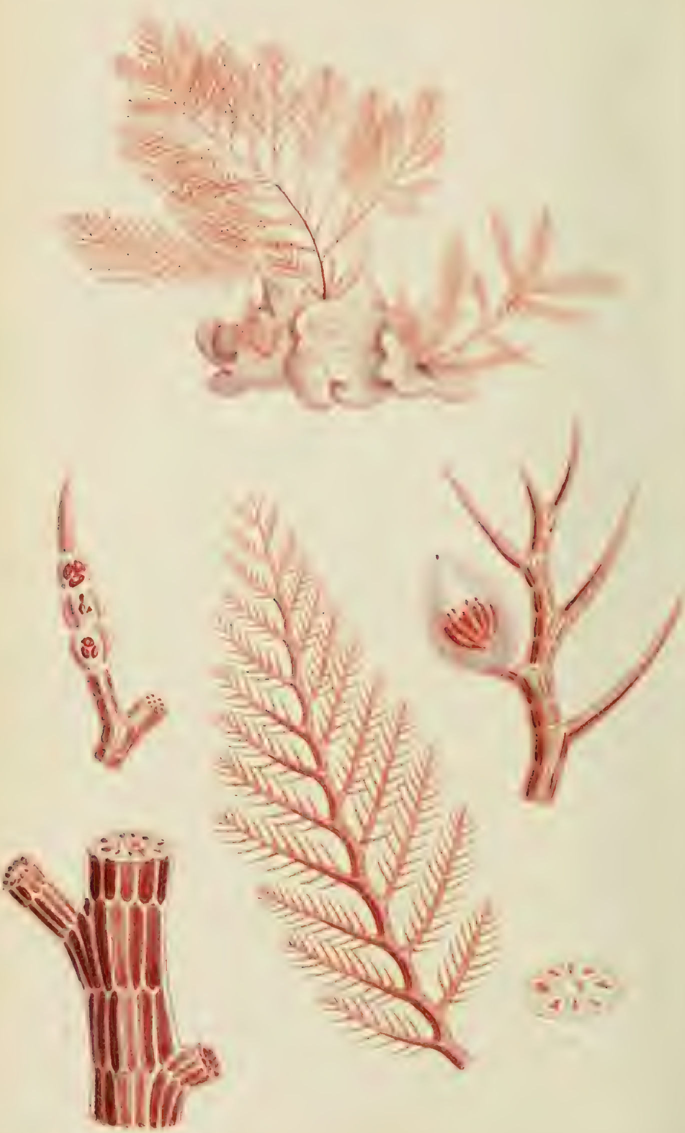

Plate CXLVII.

POLYSIPHONIA PARASITICA, *Grev.*

Gen. Char. *Frond* filamentous, partially, or generally, articulate; joints longitudinally striate, composed of numerous radiating cells or tubes, disposed round a central cavity. *Fructification* two-fold, on different individuals; 1, ovate capsules (*ceramidia*), furnished with a terminal pore; and containing a mass of pear-shaped spores. 2, *tetraspores,* imbedded in swollen branchlets. Polysiphonia (*Grev.*),—from πολὺς, *many,* and σιφων, a *tube.*

Polysiphonia *parasitica*; filaments slender, rigid, full-red, alternately branched, distichous; branches bi-tripinnate; pinnules closely set, erecto-patent, alternate, awl-shaped, acute; articulations about as long as broad, marked with three or four broad hexagonal oblong cells (or siphons) separated by pellucid spaces; siphons about eight, surrounding a narrow cavity; capsules ovate, on short stalks; tetraspores immersed in swollen pinnules.

Polysiphonia parasitica, *Grev. Fl. Edin.* p. 309. *Harv. in Hook. Br. Fl.* vol. ii. p. 330. *Wyatt, Alg. Danm.* no. 175. *Harv. in Mack. Fl. Hib.* part 3. p. 3. *Harv. Man.* p. 85. *Endl. 3rd Suppl.* p. 46.

Hutchinsia parasitica, *Ag. Syst.* p. 147. *Ag. Sp. Alg.* vol. ii. p. 103.

Hutchinsia Möstingii, *Lyngb. Hyd. Dan.* p. 116. t. 36.

Conferva parasitica, *Huds. Fl. Ang.* p. 604. (?) *Dillw. Conf. Syn.* p. 87. *E. Bot.* t. 1429.

Hab. Parasitical on the larger Algæ, and, much more frequently, on various species of *Melobesia,* at the limit of low water, and in from four to fifteen fathoms water. Rather rare; but very generally distributed on the British coasts, from Orkney to Cornwall. Remarkably fine on the Ayrshire coast, and at Arran, *Rev. D. Landsborough.*

Geogr. Distr. Atlantic shores of Europe, from the Fœroe Islands to Spain. Malta, *Dr. Lyall.*

Descr. *Fronds* several from the same base, but not densely tufted, from one to three inches in height, with an undivided or once-forked stem, not quite so thick as hog's bristle, furnished throughout its length with closely-set, alternate, distichous branches. *Branches* very variable in length; in some specimens not half an inch long; in others, almost two inches, regularly bi- or tripinnate; the pinnæ gradually diminishing in length from the base to the apex, closely set, erecto-patent, alternate; pinnules from half a line to a line in length, simple, subulate, alternate, acute. Sometimes the branches are nearly naked, the pinnæ few, and simply pinnate; and towards the base of the branches, in large specimens, the lower pinnæ are short, simple, and recurved. *Articulations* of the pinnæ about as long as broad, those of the pinnules shorter, marked with several oblong tubes, which are pointed at both ends, and separated by hyaline spaces. A transverse section shows eight tubes, surrounding a narrow cavity. *Capsules* ovate, formed out of one of the pinnules, supported on a short stalk, and containing a tuft of pear-shaped spores. *Tetraspores* ranged in a single series, in swollen pinnules. *Colour,* when growing, a fine, clear red; assuming, in drying, more or less of brown; and, if dried without steeping in fresh water, imparting a brown stain to the paper. *Substance* rather rigid, imperfectly adhering to paper.

I am happy to have this opportunity of returning my best thanks to the *Rev. D. Landsborough*, of Saltcoats, for a series of most beautiful specimens of this charming Alga; by much the finest which I have ever seen. The larger figure in our plate is taken from one of this gentleman's specimens; the smaller from one of the usual size. The difference is strikingly in favour of the Scottish plant. To Mr. Landsborough I am also indebted for the first capsule-bearing plant which I possessed; this kind of fruit being of more rare occurrence than tetraspores.

Polysiphonia parasitica is, I believe, a much more generally distributed species on our shores, than is commonly supposed; but owing to its habitat, it very frequently escapes detection. Unless it be obtained by dredging, which, in favourable localities, is, perhaps, the most certain means of procuring specimens, it can only be had by examining the submersed perpendicular sides of ledges of rock, at the extreme limit of low water. These ledges are frequently coated over with a thin spreading *Melobesia,* or with the base of *Corallina officinalis.* On these Corallines the *Polysiphonia* grows. I once found it on the stem of *Laminaria digitata,* but it was of very small size.

This species is very closely related to *Pol. pennata* of the Mediterranean, and to *P. dendroidea,* a beautiful Peruvian Alga. These plants have a *habit* more resembling that of the genus *Rytiphlæa,* but in their technical characters they do not accord with that group; and there is nothing to distinguish them in structure from other *Polysiphoniæ.* In all three the frond is slightly compressed; but this character is not peculiar to them.

Fig. 1. POLYSIPHONIA PARASITICA, growing on *Melobesia lichenoides*:—*of the natural size.* 2. Portion of a pinna. 3. Pinnule with *tetraspores.* 4. Branchlet with a capsule. 5. Portion of the frond. 6. Transverse section:—*all more or less magnified.*

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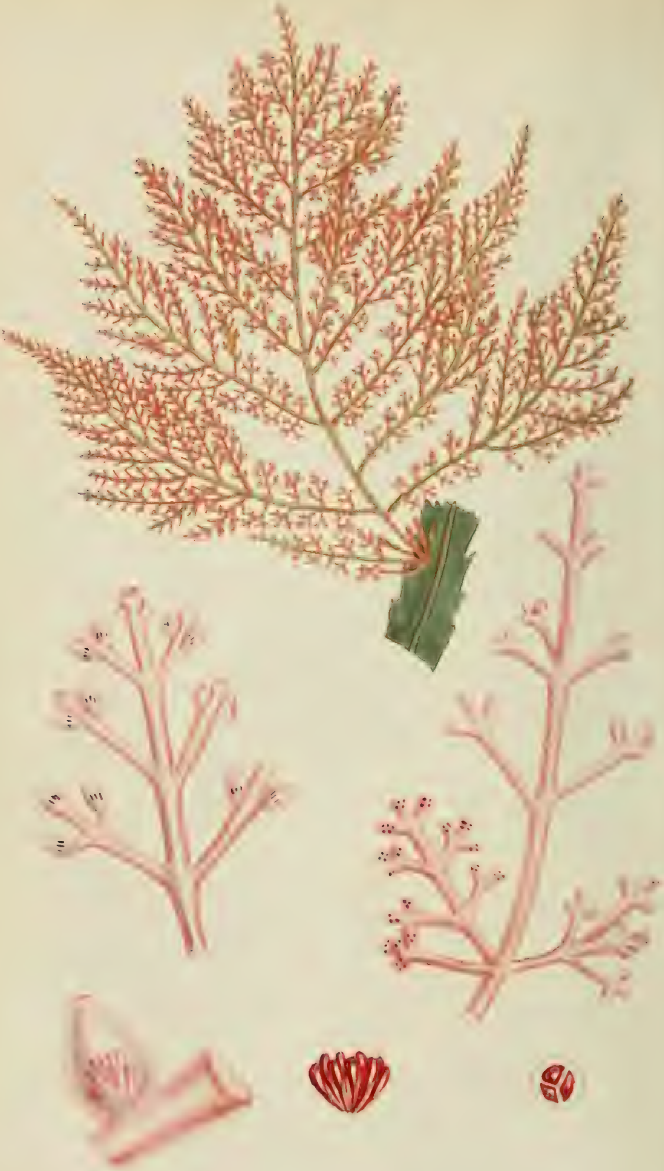

PLATE CXLVIII.

LAURENCIA OBTUSA, *Lamour.*

GEN. CHAR. *Frond* cylindrical or compressed, linear, pinnately branched, the apices obtuse; structure cellular, solid. *Fructification* of two kinds, on distinct individuals; 1, ovate *capsules* (*ceramidia*), furnished with a terminal pore, containing a tuft of pear-shaped spores; 2, triparted *tetraspores,* imbedded in the ramuli. LAURENCIA (*Lamour.*), in honour of *M. de la Laurencie,* a French naturalist.

LAURENCIA *obtusa*; frond cylindrical, filiform, repeatedly pinnate; branches patent; pinnæ and pinnulæ mostly opposite, the ultimate pinnules very short and obtuse, sometimes cruciform.

LAURENCIA obtusa, *Lamour. Ess.* p. 42. *Duby, Bot. Gal.* p. 951. *Grev. Alg. Brit.* p. 111. *J. Ag. Alg. Medit.* p. 114. *Endl. 3rd Suppl.* p. 43. *Mont. Algier.* p. 92. *Hook. Br. Fl.* vol. ii. p. 296. *Wyatt, Alg. Danm.* no. 21. *Harv. in Mack. Fl. Hib.* part 3. p. 198. *Harv. Man.* p. 70.

LAURENCIA intricata, *Lamx. Ess.* p. 43. t. 3. f. 8, 9.

LAURENCIA gelatinosa, *Lamx. sec. Ag.*

LAURENCIA lutea, *Lamx. sec. Ag.*

LAURENCIA cyanosperma, *Lamx. Ess.* p. 43.

CHONDRIA obtusa, *Ag. Sp. Alg.* vol. i. p. 340. *Syst.* p. 202. *Hook. Fl. Scot.* part 2. p. 105. *Grev. Fl. Edin.* p. 290. *Spr. Syst. Veg.* vol. iv. p. 341. *Kütz. Phyc. Gen.* p. 437.

FUCUS obtusus, *Huds. Fl. Ang.* p. 586. *Turn. Syn.* p. 43. *Turn. Hist.* t. 21. *E. Bot.* t. 1201.

HAB. Parasitical on the smaller Algæ between tide marks. Annual. Summer. Not uncommon on the shores of England and Ireland. Rare in Scotland. Frith of Forth, *Dr. Greville.* Ardrossan and Arran, *Rev. D. Landsborough.*

GEOGR. DISTR. Dispersed throughout the Atlantic and Pacific Oceans, both north and south, in temperate and subtropical latitudes. Mediterranean Sea. Mauritius.

DESCR. *Root,* a small disc, with or without accessory fibres. *Fronds* several from the same base, forming dense, globose tufts, from three to six inches long, cylindrical, of equal diameter throughout, slender, from a quarter to half a line in diameter, furnished with a simple stem, which is closely set throughout with very patent or horizontal, often opposite, lateral branches, which diminish in length from the base to the apex, so that the whole frond has a pyramidal outline. *Branches* subdistichous, or more or less quadrifarious, spirally inserted, repeatedly pinnate; pinnæ opposite, patent, the lower ones often short and multifid, the middle ones longest, lanceolate and simply or doubly pinnate, the upper gradually shorter to the tip. Ultimate *ramuli* very short, obtuse, somewhat clavate, simple, or furnished with two or three small processes above; sometimes compounded in the manner of a Greek cross. *Capsules* formed near the tips of the ramuli, but rarely perfect; more commonly converted into cup-shaped bodies. *Tetraspores* densely imbedded in the tips of the ramuli. *Colour* a fugitive pink, the main branches, and sometimes the whole frond, yellowish or transparent; the ramuli more fully coloured. *Substance* cartilaginous, tender and brittle, soon decaying in fresh water; closely adhering to paper in drying.

This species is as widely dispersed over the world as *L. pinnatifida*, and though not quite so variable as that plant in general appearance, nevertheless exhibits considerable varieties. This is to be expected in a plant which grows as well in subtropical as in temperate waters; and which even extends within the tropics. On our shores, except in colour, it preserves most of the characters represented in the plate; but continental specimens are often much taller in proportion to their breadth, till the pyramidal outline becomes almost as long, in proportion to its base, as an obelisc. When growing in sunny pools the whole plant often becomes pale yellow, preserving merely in the youngest ramuli a rosy hue; but in deeper water, and under the shade of leafy Algæ, all the branches are of a full red.

I believe that *Laurencia obtusa* is always, or, at least, very generally, a parasite on other Algæ; but it appears to be quite indifferent as to the species on which it grows. I have seen it on several plants of very different natures. Most commonly it is found on *Fucus serratus*, or on *Corallina officinalis*: but it also grows on *Chondrus crispus*, *Polysiphonia nigrescens*, and even on *Sphacelaria cirrhosa*.

Tetraspores are abundantly produced; but *capsules* I have rarely found perfect on British specimens. It is more usual to find the tips of the ramuli converted into those cup-shaped, open bodies, containing yellow flocculi, which are represented in our plate of *L. pinnatifida*.

Fig. 1. LAURENCIA OBTUSA; growing on *Fucus serratus*:—*of the natural size*.
2. Branch with capsules. 3. A capsule. 4. Tuft of spores from the same.
5. Branch with tetraspores. 6. A tetraspore:—*all magnified*.

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Plate CXLIX.

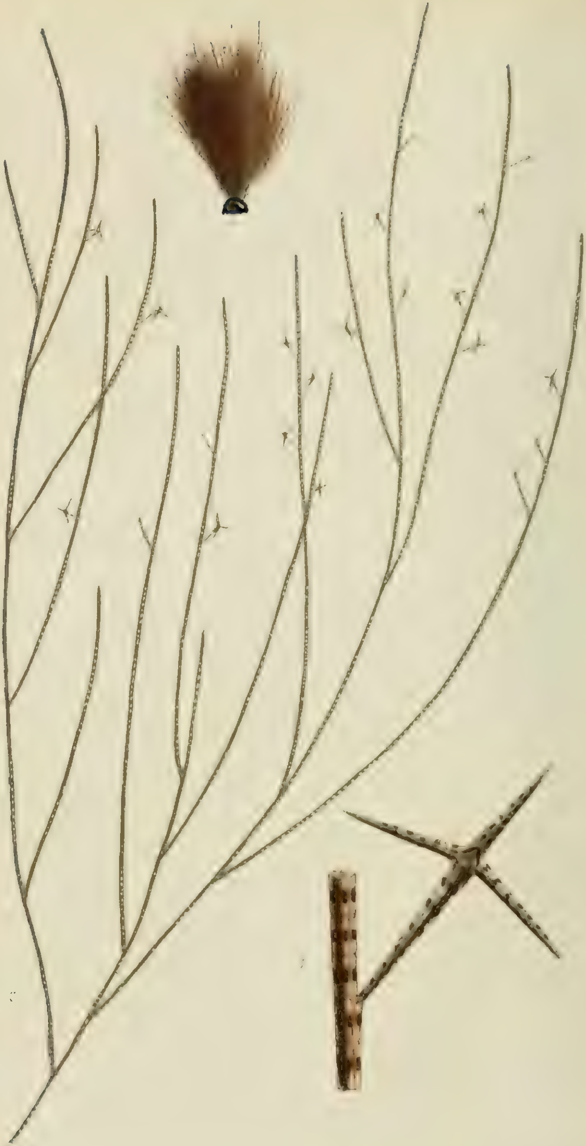

PLATE CXLIX.

SPHACELARIA FUSCA, *Ag.*

GEN. CHAR. *Filaments* jointed, rigid, distichously branched, pinnated; rarely simple or subdichotomous. *Apices* of the branches distended, membranous, containing a dark granular mass. *Fructification*; elliptical *utricles* (or *spores*), borne on the ramuli. SPHACELARIA (*Lyngb.*), —from σφακελος, *gangrene,* alluding to the withered tips of the branches.

SPHACELARIA *fusca*; filaments densely tufted, capillary, brown, distantly and irregularly branched; branches long and simple, bearing a few clavate or three-forked, minute ramuli; articulations twice as long as broad, marked by a transverse band; spores globose.

SPHACELARIA fusca, *Ag. Sp. Alg.* vol. ii. p. 34. *Harv. in Hook. Br. Fl.* vol. ii. p. 324. *Harv. Man.* p. 38.

CONFERVA fusca, *Huds. Fl. Ang.* p. 602. *With.* vol. iv. p. 141. *Dillw. Conf.* t. 95.

HAB. On rocks and stones, between tide marks. Very rare. Anglesea, *Rev. Hugh Davies.* Newton Nottage, Glamorgan, *Mr. W. W. Young.* Worms Head, and other places in Gower, *Mr. Dillwyn.* Sidmouth, *Mrs. Griffiths.* St. Michael's Mount, Cornwall, *Mr. Ralfs.*

GEOGR. DISTR. Shores of Wales and South of England.

DESCR. *Fronds* one to two inches high, forming dense pencillate tufts, very slender, irregularly branched in an alternate or spuriously dichotomous manner; branches often secund, very erect, long and simple, of equal diameter throughout. *Ramuli* very few, scattered, minute, attenuate at the base, club-shaped, or furnished immediately below the apex with three, divergent, thorn-like, somewhat horizontal processes. *Articulations* about twice as long as broad, composed of several cells, and marked with a brown transverse band in the centre. *Spores,* according to Dillwyn, globose, scattered, sometimes stalked. *Substance* rigid, not adhering to paper. *Colour* a dark chesnut brown.

Dillwyn, on whose authority the *Sphacelaria fusca* chiefly rests, gives several stations for it, on the coast of Wales, where it would seem to be pretty common. But except a single specimen sent to me several years ago by Mrs. Griffiths, and another more recently received from Mr. Ralfs, I have seen nothing of the plant; nor am I aware of any other author having found it. It may or may not be the *Conferva fusca* of Hudson, whose account is too brief to form a decided opinion upon. Never having seen a specimen of Mr. Dillwyn's plant, I am not even sure of his synonym, though the magnified portion of his figure is sufficiently like the specimen I have drawn from. Still, his saying that the plant is "from three to five inches long," a size greatly above that of my specimen, throws a doubt on the reference.

As a species, *S. fusca* (or what I take for it) will rank next *S. cirrhosa*, from which it differs by its irregular branching, by the remarkable cruciform scattered ramuli, and something in colour and in the length of the joints. *S. cirrhosa* is parasitical on other Algæ; but too little is yet known of the history of *S. fusca* to say that it is *not* so. No foreign author appears to be acquainted with the plant; Agardh having adopted it on the authority of Dillwyn's figure.

Fig. 1. SPHACELARIA FUSCA: a tuft:—*of the natural size.* 2. A filament. 3. Portion of the same, with one of the three-forked ramuli:—*both magnified.*

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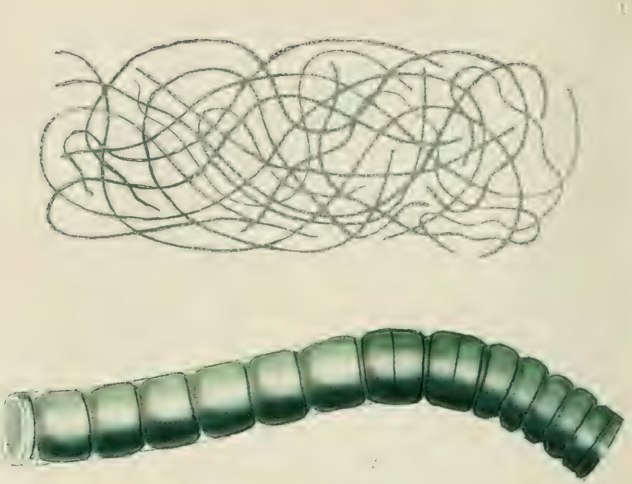
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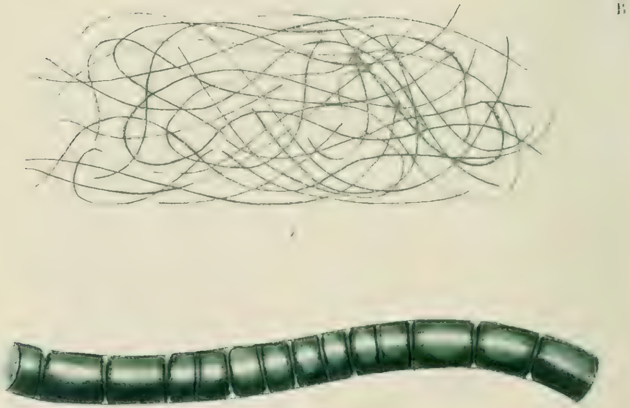
B

PLATE CL. *A.*

CONFERVA LINUM, *Roth.*

GEN. CHAR. *Filaments* green, jointed, attached, or floating, unbranched. *Fruit*, aggregated granules, or zoospores, contained in the joints, having, at some period, a proper ciliary motion. CONFERVA (*Plin.*) —from *conferruminare,* to *consolidate*; because some of the species were used by the ancients in cases of fractured bones.

CONFERVA *linum*; filaments very thick, of great length, light or dark green according to age, much curled, rigid, forming loosely entangled, harsh strata; articulations as long as broad.

CONFERVA linum, *Roth. Cat. Bot.* vol. i. p. 174. and iii. p. 257. *Fl. Dan.* p. 771. f. 2. *E. Bot.* t. 2363. *Ag. Syst.* p. 97. *Jurg.!* vol. iii no. 10. *Lyngb. Hyd. Dan.* p. 147. t. 50. *Kütz. Phyc. Gen.* p. 260. (*not of Hook. Br. Fl. or Harv. Man.*)

CONFERVA capillaris, *Huds. Fl. Ang.* p. 598. *Lightf. Fl. Scot.* p. 988. *Dillw. Conf.* t. 9.

CONFERVA crassa, *Ag. Syst.* p. 99. *Harv. in Hook. Br. Fl.* vol. ii. p. 352. *Harv. in Mack. Fl. Hib.* vol. iii. p. 225. *Harv. Man.* p. 129. *Kütz. Phyc. Gen.* p. 260.

HAB. In salt-water ditches, near the coast.

GEOGR. DISTR. Shores of Europe.

DESCR. *Filaments* from a few inches to several feet in length, twice as thick as hog's bristle, very much curled, rigid, crisp and brittle, soon becoming flaccid if exposed in the air; lying in thick, but not dense, bundles of considerable breadth, disposed in strata, one above the other. *Articulations* about as long as broad, filled with granular fluid, which in some joints is more dense than in others. Eventually the joints divide in the centre by a transverse line, and the mass separates; a new diaphragm is then gradually formed, and finally a new joint. This species varies much in colour, being sometimes of a pale, at other times a dark green, and is very often mottled with dark and light green. *Substance* rigid-membranous, scarcely adhering to paper in drying.

The plant now figured is what, in British works, is usually called *C. crassa*, a name which originated with Agardh, who regarded the *Conf. capillaris* of Dillwyn, (*Conf. linum* of E. Bot.) as being different specifically from the original *C. linum* of Fl. Dan., and founded a new species upon it. I rather hastily adopted his view in the Br. Flora; and still more incorrectly I took up, from the 'Algæ Appinenses' of Carmichael, another species under the name of *C. linum*, which is quite unlike the plant so called by Roth. That species will be figured in a future number. With regard to the *C. linum* of Roth; that it is the same as our British plant commonly called *C. crassa*, was the opinion of

Roth himself, (Cat. Bot. vol. iii. p. 257.) and is mine, after having examined a fragment of the specimen, published by Jurgens, and referred to by Agardh, for which I am indebted to the kindness of Mr. Berkeley. On placing together under the microscope specimens of *C. linum* from several localities, there may be observed minor differences between them, but all have so many characters in common, that I consider it quite inexpedient to propose more than one species. The *C. linum* of Jurgens is exceedingly like our British plant, and the slight difference may be accounted for by difference of habitat.

A. CONFERVA LINUM:—*of the natural size.* 2. Portion of a filament:—*magnified.*

PLATE CL. *B.*

CONFERVA SUTORIA, *Berk.*

CONFERVA *sutoria*; filaments setaceous, extremely long, flexuous, equal, dark green; articulations once and a half as long as broad; interstices pellucid.

CONFERVA sutoria, *Berk. Gl. Alg.* t. 14. f. 3. *Harv. Man.* p. 128.

HAB. Floating in ditches and pools, subject to the influence of the tide, at Wisbeach, *Rev. M. J. Berkeley.* Penzance, *Mr. Ralfs.*

GEOGR. DISTR. England.

DESCR. *Filaments* several inches to a foot or more in length, as thick as hog's bristle, variously curved and twisted, forming extensive loosely packed bundles or strata, which fill the pools in which they grow. *Articulations* once and a half as long as broad, filled with a dark green fluid, at length separating by a transverse medial line into two portions, which eventually become separate joints. *Colour* dark green, not variegated. *Substance* rigid, not adhering to paper in drying.

I have been favoured by the Rev. M. J. Berkeley with a portion of the specimen which he figured in the 'Gleanings,' when founding the present species; and it so nearly resembles a plant which I have received from Mr. Ralfs, that I have ventured to consider both as belonging to one species; but, to prevent mistakes, I may remark that the figure now given has been taken from Mr. Ralfs' specimen. The general habit of the plant is very similar indeed to that of *C. linum*, mixed with which Mr. Berkeley found it growing; it forms similar loosely bundled masses; but the diameter of the filament is less, and the joints are proportionably longer.

B. Fig. 1 CONFERVA SUTORIA:—*natural size.* 2. Portion of a filament:—*magnified.*

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Plate CLI.

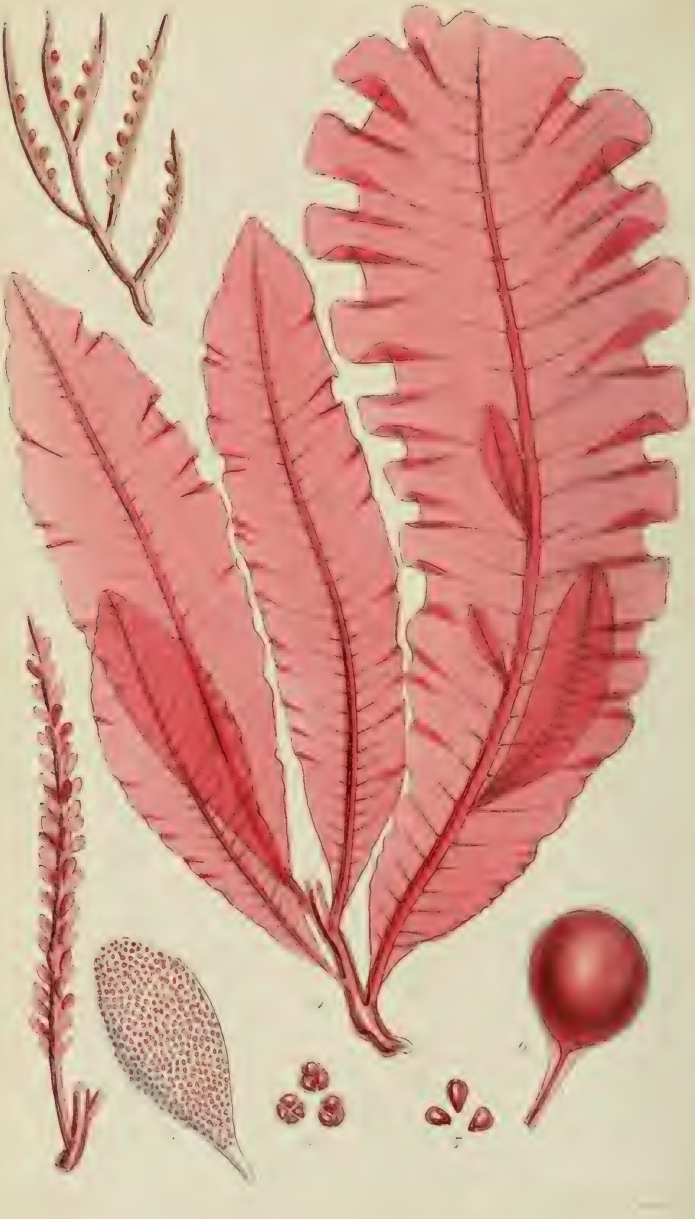

PLATE CLI.

DELESSERIA SANGUINEA, *Lamour.*

GEN. CHAR. *Frond* rose-red, flat, membranaceous, with a percurrent mid-rib. *Fructification* of two kinds, on distinct individuals; 1, spherical *tubercles* (*coccidia*), immersed in the frond, and containing a globular mass of angular spores; 2, *tetraspores* forming defined spots in the frond, or in leaf-like processes. DELESSERIA (*Lamour.*),—in honour of *Baron B. Delessert*, a distinguished Botanist and Patron of Botany.

DELESSERIA *sanguinea*; stem cylindrical, cartilaginous branched, bearing oblong or obovate, transversely veined leaves, entire at the margin; mid-rib percurrent, strong; lateral veins opposite; tubercles stalked, attached (in winter) to the membraneless mid-ribs of old leaves; tetraspores densely aggregated in small *sporophylla*, (produced in winter) on old mid-ribs.

DELESSERIA sanguinea, *Lamour. Ess.* p. 124. *Lyngb. Hyd. Dan.* p. 7. t. 2. *Ag. Sp. Alg.* vol. i. p. 172. *Ag. Syst.* p. 248. *Hook. Fl. Scot.* part 2. p. 100. *Grev. Fl. Edin.* p. 292. *Grev. Alg. Brit.* p. 72. *Hook. Br. Fl.* vol. ii. p. 285. *Harv. in Mack. Fl. Hib.* part 3. p. 191. *Harv. Man.* p. 55. *Wyatt, Alg. Danm.* no. 13. *Endl. 3rd Suppl.* p. 53. *Kütz. Phyc. Gen.* p. 445. t. 67.

WORMSKIOLDIA sanguinea, *Spr. Syst. Veg.* vol. iv. p. 331.

FUCUS sanguineus, *Linn. Syst. Nat.* vol. ii. p. 718. *Lightf. Fl. Scot.* vol. ii. p. 942. *Huds. Fl. Ang.* p. 573. *Stack. Ner. Brit.* t. 7. *Turn. Syn.* vol. i. p. 7. *Turn. Hist.* t. 36. *E. Bot.* t. 1041.

HAB. In deep rock pools, between tide-marks, generally at the shady side of the pool, under projecting ledges of rock. Biennial. Fruiting in winter. Common on the British coasts, from Orkney to Cornwall.

GEOGR. DISTR. Atlantic shores of Europe. Baltic Sea. A variety found by Dr. Hooker at Hermite Island, Cape Horn.

DESCR. *Root* a hard, conical disc. *Stem* cartilaginous, from one to six or eight inches, or more in length, more or less branched, one to three lines in diameter, nearly cylindrical or variously swollen and mis-shapen, producing on all sides, throughout its length, numerous, irregularly placed leaves. *Leaves* shortly petiolate, from four to eight or ten inches in length, and from one to four or five in breadth, tapering at base, oblong or obovate, obtuse or more or less acute, sometimes lanceolate, when young nearly flat or scarcely undulate, when old very much waved; the margin perfectly entire. *Mid-rib* strong, from half a line to more than a line in diameter, gradually attenuated upwards, pinnated with lateral, patent or subhorizontal, opposite nerves, issuing at short and equal distances, and proceeding towards the margin. Occasionally the leaf is divided in a manner between palmate and pinnate into several deep undulated lobes, whose apices are again lobed; and segment traversed by a branch of the mid-rib, which is likewise pinnated with opposite nerves. *Fructification* of both kinds produced in winter on the mid-ribs of old leaves, which have lost their membrane; 1, spherical *tubercles*, borne on little stalks, mostly along one side of the mid-rib, containing a profusion of ovate spores; 2, obovate sporophylla, densely clothing the mid-rib, and thickly covered with a stratum of minute tetraspores. *Substance* of the leaves delicately membranous, their surface glossy and shining. *Colour* a fine crimson pink. It adheres to paper in drying.

This fine plant, whether we regard the splendour of its colour or the elegance of its form, is entitled to high rank in the Oceanic Flora, and notwithstanding its common occurrence on all our shores, is never seen without attracting admiration. In favourable localities it reaches to a very large size, the length and breadth of its leaves greatly exceeding what our plate represents, and such specimens are among the most beautiful vegetable objects in nature. It therefore worthily commemorates, as the type of the genus to which it belongs, the services rendered to Botany by one of her most distinguished votaries, whose recent loss will long be severely felt, and whose place in the wide circle of which he was the centre, can never be supplied.

The variety with *lobed* leaves, mentioned in the description, was sent to me by the Rev. D. Landsborough, who gathered it on the coast of Ayrshire. It is a very curious form, showing a tendency towards *D. sinuosa*, from which, in colour and other respects, it widely differs. It has also a considerable likeness to *D. Davisii*, a plant of the Southern Hemisphere, but in that species the lateral nerves are *alternate*, not *opposite*; a character which appears to be constant. Another variety, which I have from the Baltic, has exceedingly narrow, lanceolate leaves, and, until closely examined, might pass for a form of *D. Hypoglossum*. I have seen no British specimens like it.

Dr. Hooker found at Cape Horn, two states of this species, one resembling our British plant, except that each leaf was eighteen inches in length! and proportionably broad; the other with lanceolate leaves, from whose mid-ribs innumerable minute leaflets spring. This last was only found in a young state, and may possibly belong to a distinct species, which should be called *D. Hookeri*.

Fig. 1. DELESSERIA SANGUINEA :—*of the natural size*. 2. Old mid-rib, with sporophylla; *natural size*. 3. A sporophyllum. 4. Tetraspores; *both magnified*. 5. Old mid-ribs, with tubercles; *natural size*. 6. A tubercle. 7. Spores; *both magnified*.

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Plate CLII

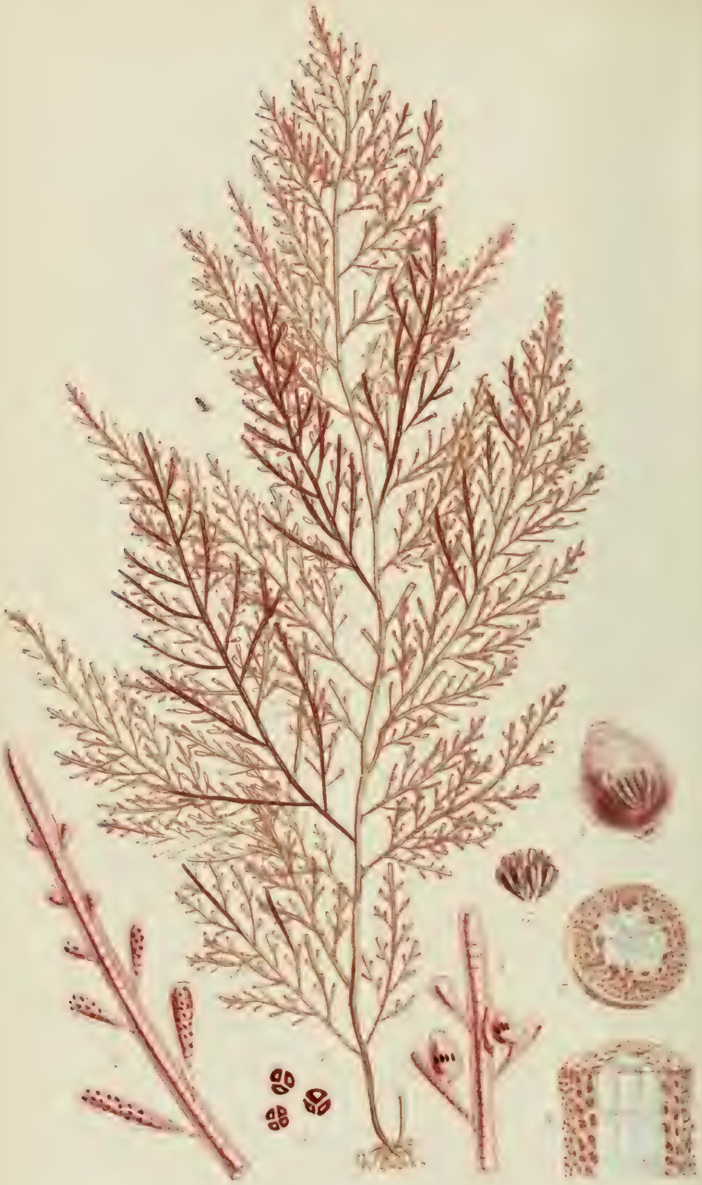

PLATE CLII.

LAURENCIA DASYPHYLLA, *Grev.*

GEN. CHAR. *Frond* cylindrical or compressed, linear, pinnately branched, the apices obtuse; structure cellular, solid. *Fructification* of two kinds on distinct individuals; 1, ovate *capsules* (*ceramidia*) furnished with a terminal pore, containing a tuft of pear-shaped spores; 2, triparted *tetraspores,* imbedded in the ramuli. LAURENCIA (*Lamour.*),—in honour of *M. de la Laurencie,* a French naturalist.

LAURENCIA *dasyphylla*; frond cylindrical, filiform, decompound-pinnate or irregularly branched; branches erecto-patent; ramuli short, club-shaped, obtuse, transversely striate, very much attenuated at the base.

LAURENCIA dasyphylla, *Grev. Alg. Brit.* p. 112. t. 14. f. 13–17. *Hook. Br. Fl.* vol. ii. p. 296. *Harv. in Mack. Fl. Hib.* part 3. p. 198. *Harv. Man.* p. 70. *Wyatt, Alg. Danm.* no. 71. *J. Ag. Alg. Medit.* p. 113. *Mont. Algier.* p. 95. *Endl. 3rd Suppl.* p. 43. *Hook. fil. and Harv. in Lond. Journ. Bot.* vol. vi. p. 401.

LAURENCIA cæspitosa, *Lamour. Ess.* p. 43. *fide Ag.*

CHONDRIA dasyphylla, *Ag. Sp. Alg.* vol. i. p. 350. *Ag. Syst.* p. 205. *Spreng. Syst. Veg.* vol. iv. p. 342. *Kütz. Phyc. Gen.* p. 436. t. 55. f. 2.

GIGARTINA dasyphylla, *Lamour. Ess.* p. 48.

FUCUS dasyphyllus, *Woodw. in Linn. Trans.* vol. ii. p. 239. t. 21. *Turn. Syn.* p. 38. *Turn. Hist.* t. 22. *Sm. E. Bot.* t. 847.

β. *squarrosa*; tufts intricate; fronds irregularly branched; the branches arched, and more or less recurved; ramuli frequently attenuated at the apex.

HAB. On stones and shells in pools, near low-water mark, generally where the surface is covered with sand or mud. β. dredged in 4–5 fathoms water. Annual. Summer. Frequent, on the shores of Great Britain, Ireland, and the Channel Islands. β. in Plymouth Sound, *Rev. W. S. Hore.*

GEOGR. DISTR. Atlantic shores of Europe and America. Mediterranean and Baltic Sea. West Indies, *Agardh.* Tasmania, *Mr. Gunn.* Cape of Good Hope, *Herb. Mertens.*

DESCR. *Root* accompanied by creeping fibres. *Fronds* several from the same base, from four to twelve inches long, or more, half a line in diameter, cylindrical, generally with an undivided, or once forked principal stem, closely set with lateral branches, the lowermost of which are longest, the rest gradually lessening upwards, so that the outline is pyramidal. *Branches* either alternate, or opposite, or two or three consecutively from the same side of the stem, more or less quadrifarious, erecto-patent, bearing a second or third series of similar, but smaller branches; the last of which are furnished with short patent, club-shaped, obtuse ramuli, from one to four lines in length, and very much attenuated at their insertion. Sometimes the branching is very dense and bushy, at other times the main branches are few, distant, and little divided. All the young branches and ramuli are transversely striate, as if jointed, owing to a peculiar arrangement of the cells of the axis. *Fructification*; ovate *capsules* or *ceramidia*, sessile on the smaller branches, containing a tuft of pear-shaped spores; 2, *tetraspores* immersed in the ramuli. *Substance* cartilaginous, soon decomposing and becoming gelatinous, and closely adhering to paper in drying. *Colour* varying from a dark purple to a pale pink, or even yellowish, according to exposure.

Laurencia dasyphylla belongs to a section of the genus distinguished by having a jointed axis, composed of four or five large cells surrounding a central cavity, exactly as in *Rytiphlœa*; and as these cells are all of equal length, their upper and lower extremities form transverse lines, which, seen through the minute cells of the surface, have the appearance of striæ. In the present species these striæ are at very short intervals. They are much more apparent in the younger parts of the frond, but the structure on which they depend is equally obvious, on dissection, in all parts.

Our variety *β*., from its long, almost naked, arching stems, recurved branches, and ramuli lengthened out into a fine, or almost cirrhose point, with the occasional interspersion of setaceous processes, has a very peculiar aspect, and may appear, on a hasty inspection, to be a distinct species; or to a person unacquainted with *L. tenuissima*, it may possibly be mistaken for that plant. But a more careful examination shows it to be perfectly analogous to the squarrose variety of *Chylocladia kaliformis*, and as both plants are found in similar situations, their peculiar characters probably depend on local causes acting similarly upon them. In the variety now under review, it rarely, if ever, happens that *all* the ramuli are drawn into long points, or *all* the branches arched and recurved; but the majority are in these conditions.

It will be seen that the geographical distribution of this species is very extensive. I have received it from many distant quarters, both of the Northern and Southern Hemispheres, but have not gathered it at the Cape of Good Hope, whence it appears to have been sent to Prof. Mertens. There is, however, a Cape species figured in my NEREIS AUSTRALIS (t. 31.), which somewhat resembles it, but is truly distinct.

Fig. 1. LAURENCIA DASYPHYLLA:—*of the natural size.* 2. Apex of a branch, with tetraspores. 3. Tetraspores. 4. Apex with capsules. 5. A capsule. 6. Tuft of spores from the same. 7. Transverse section of the frond. 8. Longitudinal section:—*all more or less magnified.*

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Plat. CLIII.

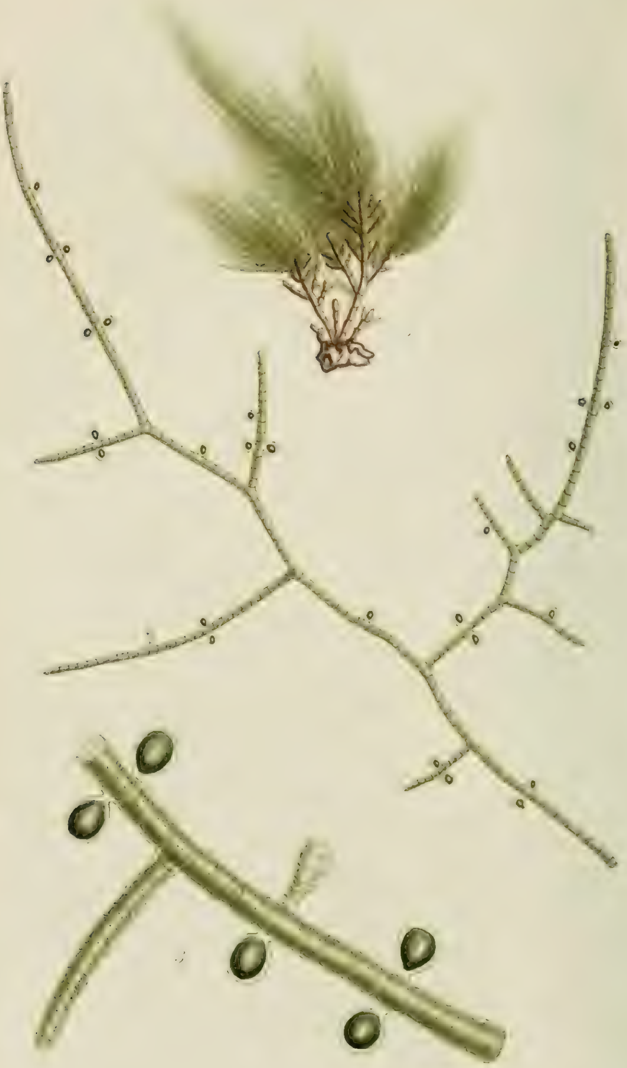

PLATE CLIII.

ECTOCARPUS PUSILLUS, *Griff.*

GEN. CHAR. *Frond* capillary, jointed, olive or brown, flaccid, single-tubed. *Fruit* either spherical, elliptical, or lanceolate *utricles* (or *spores*), borne on the ramuli, or imbedded in their substance. ECTOCARPUS (*Lyngb.*),—from εκτος, *external,* and καρπος, *fruit.*

ECTOCARPUS *pusillus*; filaments tufted, interwoven, sparingly branched; branches distant, very patent, flexuous, bearing a few, irregular, patent, flexuous ramuli; spores roundish-oblong, subsessile, frequently opposite.

ECTOCARPUS pusillus, *Griff. in Wyatt. Alg. Danm.* no. 212. *Harv. Man.* p. 41. *E. Bot. Suppl.* t. 2872.

HAB. Parasitical on several of the smaller Algæ. Annual. Rare. Torquay, *Mrs. Griffiths.* Land's End, St. Michael's Mount, and Ilfracombe, *Mr. Ralfs.*

GEOGR. DISTR. South Coast of England.

DESCR. *Filaments* forming intricate, more or less interwoven tufts, from three to six inches in length, resembling "pale-brown wool;" slender, subsimple or sparingly branched, flexuous or somewhat zigzag, of equal diameter throughout, obtuse. *Branches* few, distant, very patent, very unequal in length, variously curved, obtuse, naked, or having a few very patent or horizontal, obtuse, unequal, scattered ramuli. *Spores* generally abundant, scattered over the filaments, roundish-oblong or sessile or subsessile, very elliptical, frequently opposite. In some cases the empty spore-case, after it has discharged the spore, alters its form, acquires joints, and seems to elongate into a ramulus. *Articulations* of the principal branches rather longer than broad, filled with granular fluid, contracted at the joints. *Substance* membranous, void of gloss, adhering, but not very closely, to paper in drying. *Colour*, when young, greenish olive, becoming gradually a pale brown.

One of the least beautiful forms of the genus, but not without interest, as a connecting link between the simpler and more branching species. It was first found by Mrs. Griffiths in the year 1835, and first made known to botanists in the excellent, and often quoted, 'Algæ Danmonienses' of Mrs. Wyatt. It grows on several of the smaller Algæ, which it clothes with shaggy flocculi, compared by Mrs. Griffiths to tufts of "pale-brown wool." In drying it sometimes assumes a green colour.

The nearest species, among British plants at least, to which it approaches, is the *E. crinitus* of Carmichael, a little-known plant, having a very similar mode of branching and general habit; but differing in its greener colour, larger size, and more especially in the form of its fruit, and in the locality in which it is found.

Ectocarpus pusillus has not, that I am aware, been noticed anywhere save on the south coast of England, but it is one of those *unobtrusive* plants, if I may so call them, which, unless closely looked for, are easily over-looked; and as it has few beauties to recommend it to the mere gatherer of "pretty things," it may often be neglected as not worth notice, or as being some other plant in an imperfect state. It is no easy matter, at all times, to recognize the different *Ectocarpi* by the naked eye, and this accounts for so many species of this genus being passed over by persons who are unaccustomed to the microscope.

Fig. 1. ECTOCARPUS PUSILLUS; growing on *Corallina officinalis*:—*of the natural size.* 2. Portion of a filament, in fruit:—*magnified.* 2. Portion of the same:—*more highly magnified.*

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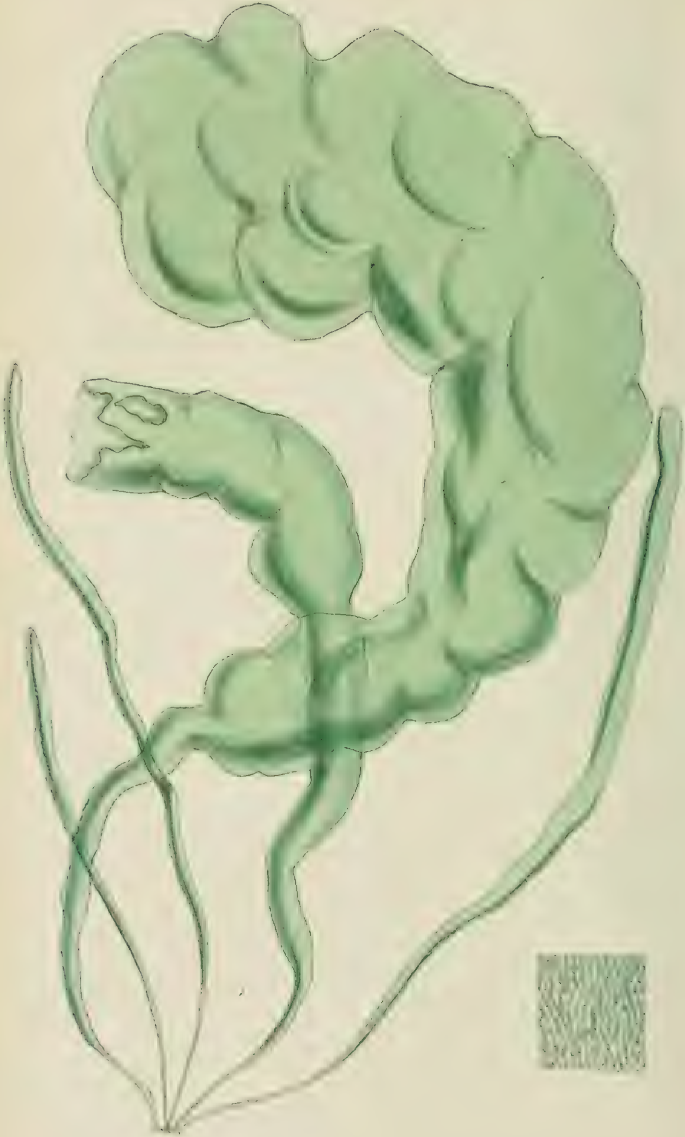

PLATE CLIV.

ENTEROMORPHA INTESTINALIS, *Link.*

GEN. CHAR. *Frond* tubular, membranaceous, of a green colour and reticulated structure. *Fructification*; granules, commonly in fours, contained in the cellules of the frond. ENTEROMORPHA (*Link.*),—from *εντερον*, an *entrail*, and *μορφη*, *form* or *appearance.*

ENTEROMORPHA *intestinalis*; fronds perfectly simple, elongated, becoming inflated, obtuse, tapering extremely to the base.

ENTEROMORPHA intestinalis, *Link. Hor. Phys. Ber.* p. 5. *Grev. Alg. Brit.* p. 179. *Hook. Brit. Fl.* vol. ii. p. 313. *Harv. in Mack. Fl. Hib.* part 3. p. 242. *Harv. Man.* p. 174. *Wyatt, Alg. Danm.* no. 80. *E. Bot. Suppl.* t. 2756. *Kütz. Phyc.* p. 300.

SOLENIA intestinalis, *Ag. Syst. Alg.* p. 185. *Spr. Syst. Veg.* vol. iv. p. 367.

SOLENIA Bertolini, *Ag. Syst.* p. 185. *Spr. Syst. Veg.* vol. iv. p. 367.

SCYTOSIPHON intestinalis, *Lyngb. Hyd. Dan.* p. 67.

FISTULARIA intestinalis, *Grev. Fl. Edin.* p. 300.

ILEA intestinalis, *Gaill. Dict. Sc. Nat.* vol. 53. p. 373.

TETRASPORA intestinalis, *Desv. Fl. Angers.* p. 17.

ULVA intestinalis, *Linn. Huds. Fl. Ang.* p. 568. *Lightf. Fl. Scot.* p. 968. *Ag. Syn.* p. 45. *Ag. Sp. Alg.* vol. i. p. 418. *Hook. Fl. Scot.* part 2. p. 91.

CONFERVA intestinalis, *Roth. Cat. Bot.* vol. i. p. 159.

HAB. Attached to various substances in the sea, between tide-marks; also in brackish and fresh-water ditches near the coast. Often floating. Annual. Summer. Very common.

GEOGR. DISTR. In similar situations, in most parts of the world.

DESCR. *Root* a minute, scutate disc. *Frond* from a few inches to one or more feet in length, and from a line to three or four inches, or more in diameter, tubular, obtuse, tapering at base to little more than the diameter of hog's bristle, gradually becoming inflated upwards, and in old age often swelling out into a large membranous bag, which is variously crisped and curled. Sometimes the whole frond is compressed, and very much crisped. *Substance* thin and membranous, but not gelatinous, not closely adhering to paper in drying. *Colour* varying from a transparent yellowish green, to a full grass-green; in old age and decay fading to a dirty white. Under the microscope, a portion of the frond exhibits the appearance of a transparent membrane, covered with green, unequal, angular cells.

A very common shore plant in all parts of the world, extending from the limits of vegetation in the Northern Hemisphere through all intervening latitudes to a similar point in the south; and inhabiting not merely the sea, but brackish, or even fresh-water, ditches in the neighbourhood of the coast. It varies greatly in size, and in the degree of inflation, but in no other characters. Broad varieties of *E. compressa* strongly resemble some of its states, but these are always *branched*, though often in a very slight degree; whereas *E. intestinalis* is invariably simple. The compressed variety has most the look of a distinct species, and may be sometimes confounded with *Ulva linza*, under which name I have sometimes seen it in Herbaria; but the form of these plants is sufficiently different, the one being truly lanceolate, the other obtuse at one end, and very much attenuated at the other.

I am indebted to the Rev. J. Pollexfen for a prepared specimen of Sea-weed, which seems to be an *Enteromorpha*, probably our *E. intestinalis*, and which is used by the inhabitants of Japan as an ingredient in their soups, much as Macaroni is employed with us. Thunberg, in his travels, mentions that several of the *Ulvæ* and *Fuci* are so employed by the Japanese. In the present instance, the fronds have been freed of their salt, bleached, and tied up in cylindrical bundles, about a foot in length, and four inches in diameter, and, at first sight, have the look of Isinglass. The specimen was given to Mr. Pollexfen by Mr. Reeves of Clapham, who had it from a Dutch gentleman, to whom it had been sent from Batavia, to which place vessels trading to Japan bring it with other articles. It is also said to be in use in China.

Fig. 1. ENTEROMORPHA INTESTINALIS, in various stages of growth:—*of the natural size.* 2. Minute portion of the surface:—*magnified.*

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Plate CLV

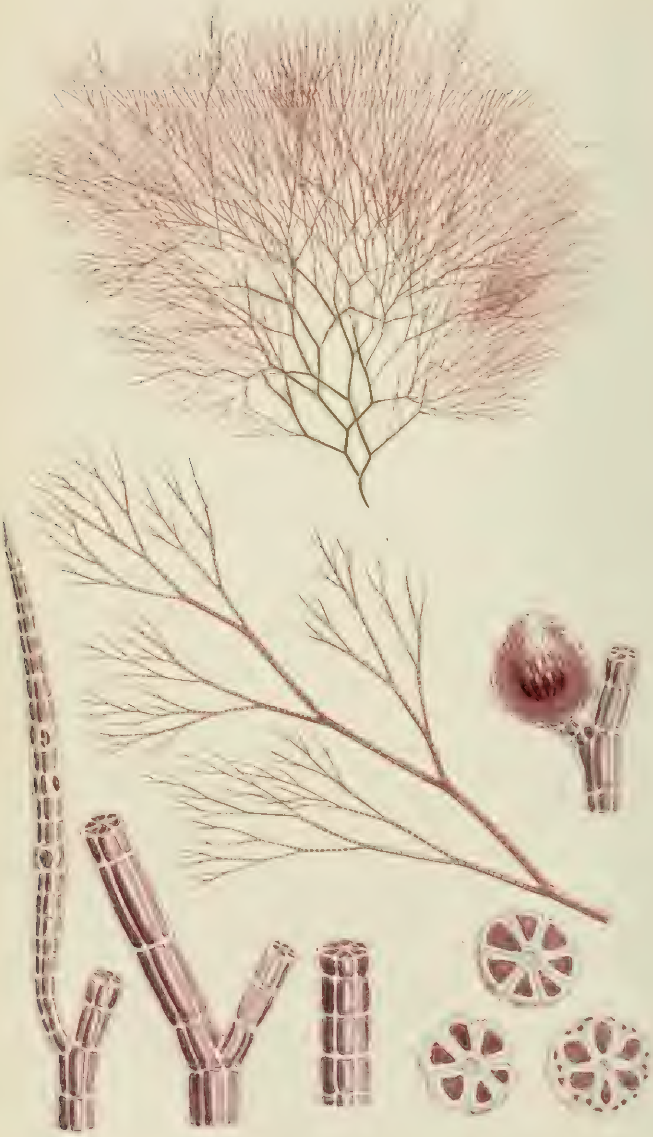

Plate CLV.

POLYSIPHONIA VARIEGATA, *Ag.*

Gen. Char. *Frond* filamentous, partially or generally articulate; joints longitudinally striate, composed of numerous radiating cells or tubes, disposed round a central cavity. *Fructification* two-fold, on different individuals; 1, ovate *capsules* (*ceramidia*), furnished with a terminal pore, containing a mass of pear-shaped spores; 2, *tetraspores* imbedded in swollen branchlets. Polysiphonia (*Grev.*),—from πολυς, *many*, and σιφων, a *tube.*

Polysiphonia *variegata*; filaments brownish-purple, or greenish, setaceous, and rigid below, gradually attenuated upwards to a capillary fineness, dichotomous, the lower axils very patent; branches somewhat zig-zag, elongated, much divided, set with lateral, capillary and very flaccid, multifid, purple ramuli; articulations near the base shorter than their breadth, twice as long as broad in the principal branches, and gradually becoming shorter upwards, marked with three, broad, parallel, oblong cells, separated by pellucid spaces; tubes six or rarely seven, surrounding a minute cavity; capsules ovate, on a short stalk.

Polysiphonia variegata, *J. Ag. Alg. Medit.* p. 129. *Endl. 3rd Suppl.* p. 45. *Kütz. Phyc. Gen.* p. 424.

Polysiphonia peucedanoides, *Mont. Herb.*

Hutchinsia variegata, *Ag. Syst.* p. 153. *Ag. Sp. Alg.* vol. ii. p. 81.

Gramita peucedanoides, *Bonnem. Mem. Mus.* 1824.

Hab. On mud-covered rocks in bays and estuaries, also on *Zostera, Chorda filum,* floating timber, &c. Annual. Summer and autumn. Very local. St. German's River (1846), *Mr. Rohloff.* Beggar's Island, Trevol, Torpoint, and various other places near Plymouth, *Rev. W. S. Hore* and *Dr. J. Cocks.*

Geogr. Distr. Atlantic shores of France and Spain. Mediterranean and Adriatic Seas; very abundant at Venice. West Indies, *Agardh.* Atlantic shores of N. America, *Prof. Bailey,* &c.

Descr. *Fronds* forming dense tufts, from four to eight or ten inches long, as thick as hog's bristle and somewhat rigid at base, gradually attenuated upwards, and becoming more flaccid until they pass away into a capillary or byssoid fineness. *Filaments* very much branched, dichotomous, the lower axils very patent or divaricating, close together, the upper gradually more distant and less spreading; secondary branches somewhat virgate, zig-zag, set with more or less divided, and more or less dense dichotomous ramuli, whose axils are very acute; ramuli very flaccid and slender. *Articulations* in the lower part of the filament shorter than broad, sometimes opake (in old plants); in the branches once and a half to twice as long as broad; gradually shorter in the ramuli; all of them marked with three broad tubes. A cross section of a branch shows six, or rarely seven, radiant cells; that of an old stem has a more or less complete row of external cellules. *Capsules* broadly ovate, plentiful on the lesser branches and ramuli, shortly stalked. *Tetraspores* small, imbedded in slightly swollen ramuli. *Colour* of the lower part of the stem often greenish, of the upper, and especially of the ramuli, more or less dark-purple. *Substance* rigid below, flaccid and gelatinous above.

It was with much pleasure that I received, in the summer of 1846, from my friend Mr. Rohloff, a specimen of this interesting and beautiful species, which he was so fortunate as to discover in that year; and I have to thank him, as well as my friends Mr. Hore and Dr. Cocks, for a liberal supply of specimens gathered in several localities near Plymouth, in the summer and autumn of 1847. It appears to be an abundant species in that neighbourhood, where it grows in the greatest luxuriance. As yet no other locality in Britain has been recorded, but it will probably hereafter be found in similar situations on the south coast of England, and south and west of Ireland. The favourite locality of this plant seems to be mud-banks, or mud-covered rocks. It requires some algological zeal to hunt over such ground,—which, to many collectors, would appear little likely to yield anything so beautiful; yet such ground is very favourable to the growth of many of this genus, and of the finest *Callithamnia*.

No species need be more distinct than this is. Its habit is very like that of *P. elongella*, it is true, but the purple colour affords an obvious character; while the *six tubes* of the stem furnish an important distinction from that, and all other British species yet known.

P. variegata is widely dispersed through the warmer latitudes of the Atlantic, and abounds on certain parts of the Mediterranean and Adriatic shores. Indeed, where it establishes itself, it generally occurs in quantity. At Venice it is the commonest of the genus; but Venetian specimens are greatly inferior in size and beauty to some of their Plymouth brethren. Those which I have received from Dr. Bailey of New York are nearest to the luxuriance of the latter.

My friend Dr. Montagne contends that the specific name *peucedanoides*, under which this plant was described by Bonnemaison, in the same year that Agardh published it under the name here adopted, should be preferred. It has only this inconvenience, the changing a name now universally known, for one which is little known, and of which the priority, its only recommendation, is disputable. We have no proof that Agardh was acquainted with Bonnemaison's synonyme at the time he published the 'Systema.'

Fig. 1. Polysiphonia variegata:—*of the natural size*. 2. Apex of a branch, with lateral ramuli. 3. A ramulus. 4. Portion of a branch. 5. Portion of the stem. 7, 8. Sections of branch. 9. Section of old stem:—*all more or less highly magnified*.

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Plate CLVI

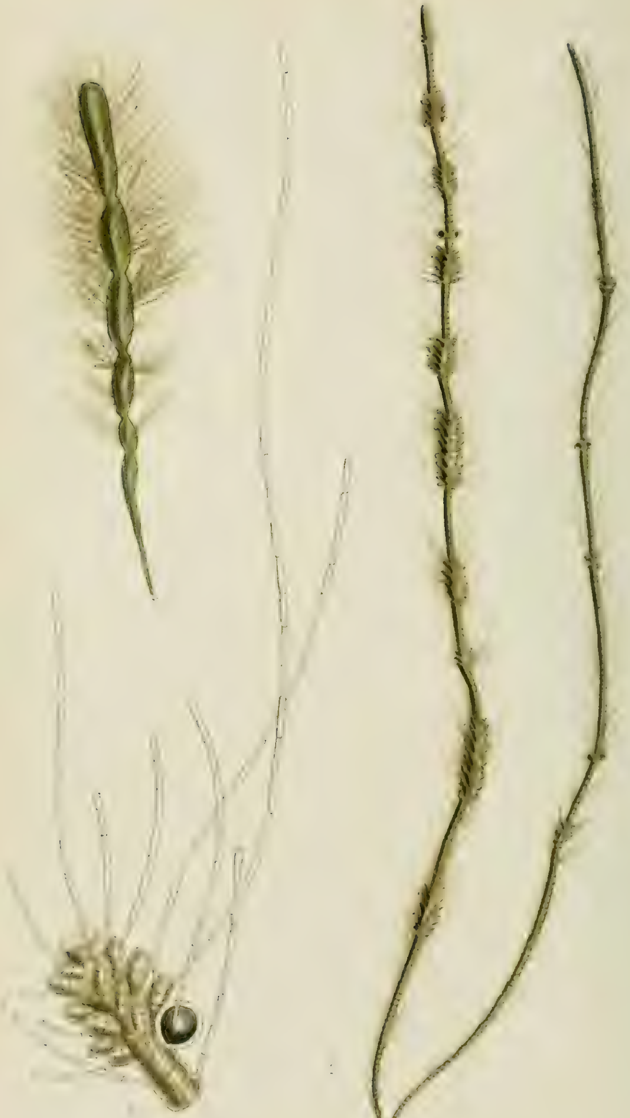

Plate CLVI.

MYRIOTRICHIA FILIFORMIS, *Harv.*

Gen. Char. *Fronds* capillary, flaccid, jointed, (simple) beset with quadrifarious, simple, spine-like ramuli, clothed with byssoid fibres. *Fructification*; ellipticle *utricles* (or *spores*) containing a dark-coloured mass. Myriotrichia (*Harv.*),—from μυριος, a *thousand*, and θριξ, a *hair*.

Myriotrichia *filiformis*; stem filiform, slender, often flexuous or curled, beset at irregular intervals with oblong clusters of short, papillæform ramuli.

Myriotrichia filiformis, *Harv. Man.* p. 44. *Wyatt, Alg. Danm.* no. 213.

Hab. Parasitical on *Chorda lomentaria*, often accompanying *M. claværformis*. Annual. Summer. Not uncommon on the English and Irish shores.

Geogr. Distr. British Islands.

Descr. *Fronds* an inch or more in length, very slender, densely clothing the fronds of *Chorda lomentaria*, tufted, flexuous, simple, filiform, at intervals appearing thickened or knobbed; the knobbed portions formed of exceedingly dense, short, papillæform ramuli. Both the ramuli and the main stems emit numerous, long, simple, colourless, byssoid fibres. *Articulations* shorter than broad, filled with dense, granular matter. *Spores* spherical, with a hyaline pericarp, variously scattered along the main filament. *Colour* varying from a yellowish olive to a pale brown. *Substance* tender, and more or less gelatinous, closely adhering to paper, and usually glossy when dry.

A comparison of the figure here given, with that of *M. clavæformis* at Plate CI., will best show the differences between these two plants. It will be seen that while in the former the ramuli regularly increase in length from the base upwards so as to give the frond a club-shaped, or very slender pear-shaped outline; in this they preserve nearly an equal length in different parts of the frond, and are collected into oblong clusters, separated by spaces bare of ramuli. In all other respects the two plants closely resemble each other, and as they are frequently found intermixed on the same frond of *Chorda lomentaria*, I formerly regarded the present as merely a state of *M. clavæformis*. The merit of having correctly distinguished these closely allied species is due to Mrs. Griffiths, who first pointed out the peculiar characters of both.

M. filiformis is much the most abundant species, and is, indeed, very generally to be found clothing the *Chorda*, when the latter grows in small shallow pools, exposed to strong sunlight. In such localities almost every frond of *Chorda lomentaria* is converted into a soft, cylindrical brush, from the multitudes of these little parasites, clothed with their gelatinous, transparent hairs, which, while the plant remains in the water, stand out on every side, keeping each little filament free of its neighbour. When drawn into the air, the whole falls together in a gelatinous mass.

In the list of British Algæ given at the conclusion of our first volume, the names *Ectocarpus simplex*, Ag., and *E. villum*, Harv., occur. Since that list was printed I have made a more careful examination of the specimens on which these names were imposed, and fear that both are referable to young states of *M. filiformis*. Never having seen an authentic specimen of Agardh's *E. simplex*, I cannot take it upon me to pronounce his plant to be identical with the Jersey plant so named by me; but judging from the description given by that author, I think it very probable that his plant is the same as ours, and therefore to be regarded as a synonyme of *M. filiformis*. In strict priority, should this opinion be established, the specific name "*simplex*" would belong to our present species, but as this word denotes a character common to the genus, it seems undesirable to adopt it for a species.

Fig. 1. A plant of *Chorda lomentaria* infested with MYRIOTRICHIA FILIFORMIS:—*of the natural size*. 2. Fronds of the latter:—*magnified*. 3. Small portion of a frond—*highly magnified*.

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Plate CLVII.

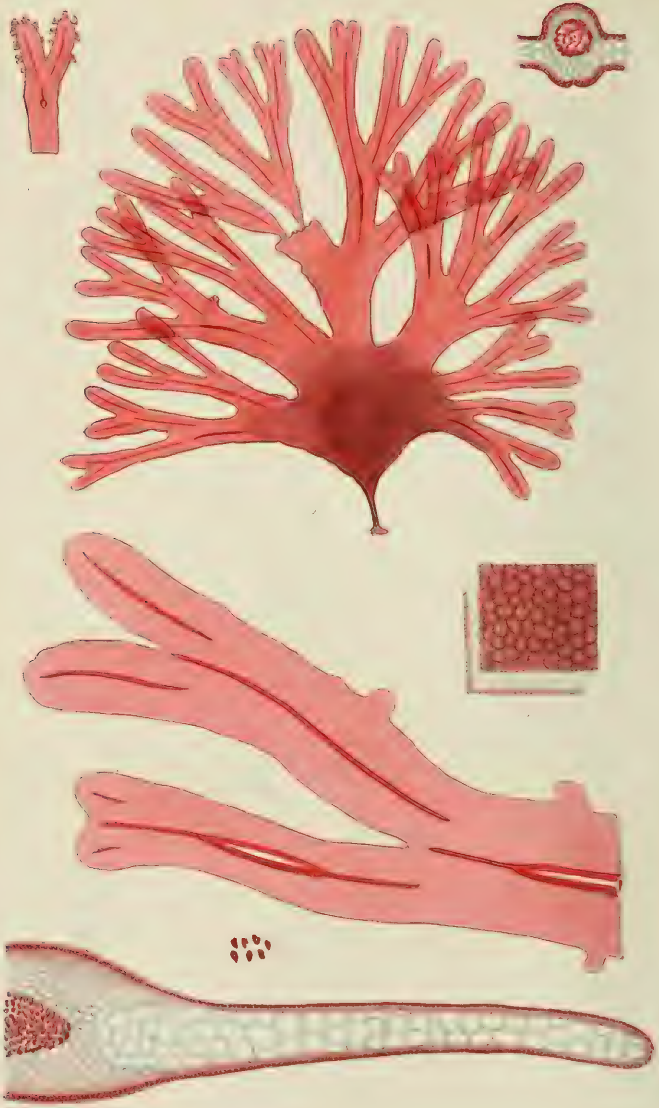

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PLATE CLVII.

STENOGRAMME INTERRUPTA, *Mont.*

GEN. CHAR. *Frond* rose-red, leaf-like, nerveless, laciniate; composed, *internally*, of large, transparent, stratified cells; *externally* of minute, coloured cellules. *Fructification*; 1, linear, convex, longitudinal, (nerve-like) *conceptacles*, containing a dense mass of minute *spores*; 2, *tetraspores* (unknown)? STENOGRAMME (*Harv.*),—from στενος, *narrow*, and γραμμη, a *line*; alluding to the linear fructification.

STENOGRAMME *interrupta*; frond stipitate, membranaceous, flabelliform, more or less deeply laciniate; laciniæ repeatedly dichotomous, their apices obtuse; conceptacles forming a nerve-like line through the centre of each lacinia, and (usually) abruptly terminating opposite the furcation.

STENOGRAMME interrupta, *Mont. in Duchart. Rev. Bot.* 1846. p. 483.

STENOGRAMME europea, *Harv. in Herb.* 1847.

DELESSERIA interrupta, *Ag. Sp. Alg.* vol. i. p. 179. *Ag. Syst.* p. 250. *Mont. in Webb, Ot. Hisp.* p. 15. t. 8. *Endl. 3rd Suppl.* p. 53.

HAB. Among rejectamenta, probably washed up from deep water. Annual? November. Very rare. Bovisand, near Plymouth, *Dr. John Cocks.* Mount Edgecombe, *Rev. W. S. Hore.*

GEOGR. DISTR. Cadiz, *Cabrera.* Plymouth Harbour.

DESCR. *Root*, a small conical disk. *Frond* furnished with a short stem, 3–4 lines long, which soon becomes compressed, and rapidly expands into a fan-shaped membrane, from three to five inches, or perhaps more, in length, and fully as much in breadth. In some specimens the membranous expansion is divided, nearly to its base, into numerous, linear, ribbon-like laciniæ, which are more or less regularly dichotomous, with narrow axils, and rounded tops; in others the laciniated portion extends only a half, or two-thirds the length of the frond, the remainder being undivided; and in others again, the truncated tips of the frond, which have been injured from some cause, throw out proliferous, cuneate, forked leaflets. In all varieties, something of a fastigiate outline is preserved. The margin, which is usually quite flat and very entire, sometimes throws out minute, lobed, and somewhat curled fringing processes. Barren fronds are quite destitute of nerve; *fertile* ones (which are more common) have the centre of each lacinia traversed by a raised, nerve-like line, which commences just below one of the forkings, and terminates nearly opposite to a lower fork: this is the commencement of fructification. It rarely, if ever, happens that the whole of this line proves fertile; usually, small portions varying from one to four lines in length become much thickened, considerably raised, and of a dark-red colour; and these, at maturity, are filled with innumerable, minute spores; sometimes but a very minute portion of the line is transformed, and a *spherical conceptacle* results (fig. 6.). *Substance* cartilagineo-membranous, becoming flaccid, and adhering to paper in drying. *Colour* a fine clear, pinky red, becoming orange in fresh water; darker towards the base, and becoming duller in drying, but preserving a polished surface. The cells of the central portion of the frond are large, and apparently empty, in two or three rows; those of the outer stratum minute, irregularly placed, and full of coloured matter.

* * *

This very interesting plant, by far the most important addition which has been made to the British Marine Flora since the commencement of the present work, was discovered on the 21st October, 1847, by Dr. John Cocks of Plymouth, among rejectamenta on the shore at Bovisand. A few days subsequently it was met with in a neighbouring station by the Rev. W. S. Hore, who at the same time gathered the equally rare and curious *Carpomitra Cabreræ*; and to the untiring perseverance of both these gentlemen, who, day by day, during the inclement month of November—in all weathers—visited the shore, and preserved every scrap of these plants which the waves threw up, we are indebted for all the British specimens which have yet been taken of the *Stenogramme*, and for all, except Miss Ball's original one, of the *Carpomitra*. To Dr. Cocks and Mr. Hore, I am anxious to express my obligations for numerous specimens of these rare plants; and to the latter especially, for much important information illustrating the history of the present. It is right to state that Mr. Hore's observation led to my correcting the error into which, following Agardh, I should have fallen, of describing the thickening of the frond, caused by incipient fructification, as a true nerve. Mr. Hore having found a barren specimen in which no such nerve exists, established the truth of his view, which he had previously entertained from other considerations.

The genus *Stenogramme* was originally proposed by me, in the 'Botany of Beechey's Voyage,' for a plant found on the coast of California which strongly resembles the present in habit, and quite agrees with it in structure and fructification. Strange to say, according to a specimen preserved in Bory St. Vincent's Herbarium, *S. Californica* appears to be a native of France also!

English specimens of *S. interrupta* are broader, less regularly, and less deeply divided than the figure of a Spanish specimen given by Montagne; but I am assured by my learned "Confrère en Flore," that he considers the plants to be identical.

Fig. 1. STENOGRAMME INTERRUPTA:—*of the natural size.* 2. Portion:—*slightly magnified.* 3. Vertical cross section of half the breadth of a fertile lacinia. 4. Spores. 5. Magnified view of the surface:—*all magnified.* 6 Portion of a frond with fimbriated margin and *spherical* conceptacle:—*of the natural size.* 7. Section of the same:—*magnified.*

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Plate CLVIII.

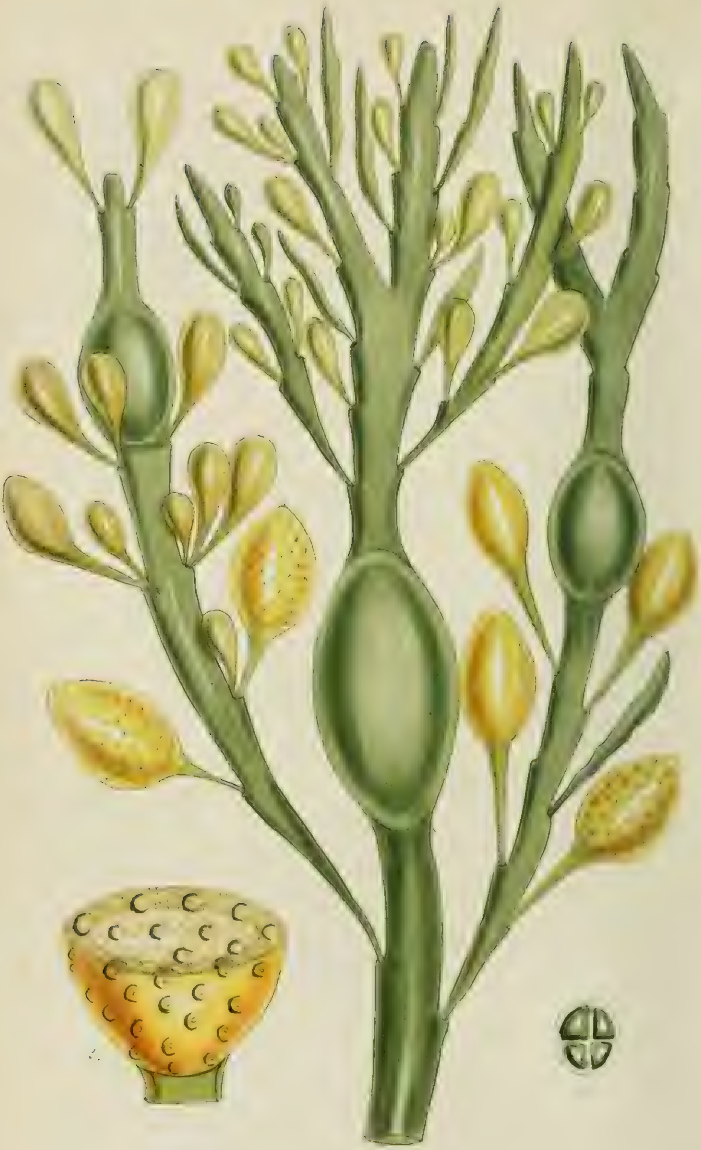

PLATE CLVIII.

FUCUS NODOSUS, *Linn.*

GEN. CHAR. *Frond* linear, either flat, compressed, or cylindrical, dichotomous (rarely pinnated), coriaceous. *Air-vessels,* when present, innate, simple. *Receptacles* either terminal or lateral, filled with mucus traversed by a net-work of jointed fibres, pierced by numerous pores, which communicate with immersed, spherical *conceptacles,* containing parietal *spores,* or *antheridia,* or both. FUCUS (*L.*),—from φυκος, a *Sea-weed.*

FUCUS *nodosus*; frond compressed, without distinct rib, leathery, sub-dichotomous; branches strap-shaped, somewhat pinnated, attenuate at base, remotely toothed, here and there swelling into oblong air-vessels; receptacles lateral, ovate, stalked, springing from the axils of the marginal teeth.

FUCUS nodosus, *Linn. Sp. Pl.* p. 1628. *Fl. Suec.* p. 431. *Fl. Lapp.* p. 366. *Lightf. Fl. Scot.* vol. ii. p. 918. *Huds. Fl. Ang.* p. 584. *With.* vol. iv. p. 84. *Stack. Ner. Brit.* p. 35. t. 10. *Fl. Dan.* t. 146. *E. Bot.* t. 570. *Esper,* p. 25. t. 7. and p. 118. t. 60. *Gm. Hist.* t. 1. *B.* f. 1. *Turn. Syn.* p. 252. *Turn. Hist.* t. 91. *Lamour. Ess.* p. 19. *Ag. Sp. Alg.* vol. i. p. 85. *Ag. Syst.* p. 275. *Hook. Fl. Scot.* part. 2. p. 94. *Grev. Fl. Edin.* p. 284. *Spr. Syst. Veg.* vol. iv. p. 316. *Grev. Alg. Brit.* p. 16. *Hook. Br. Fl.* vol. ii. p. 268. *Wyatt, Alg. Danm.* no. 154. *Harv. in Mack. Fl. Hib.* part 3. p. 169. *Harv. Man.* p. 21. *Endl. 3rd Suppl.* p. 29.

HALIDRYS nodosa, *Lyngb. Hyd. Dan.* p. 37. t. 8.

PHYSOCAULON nodosum, *Kütz. Phyc. Gen.* p. 352.

OZOTHALLIA vulgaris, *Dne. in An. Sc. Nat.* 1845. p. 13.

HAB. Growing on sub-marine rocks and large boulder stones, from ordinary high-water mark to half-tide level. Perennial. Winter and Spring. Very common.

GEOGR. DISTR. Atlantic shores of Europe and North America.

DESCR. *Root* a hard, conical disc, one or two inches in diameter. *Fronds* tufted, from two to four or six feet in length, from a quarter to half an inch or more in width, compressed, two-edged, thickened into an obscure rib in the middle, especially in older parts, linear, once or twice forked at considerable intervals, remotely toothed at the margin. From the axils of the teeth spring lateral, distichous branches similar to the main frond, toothed and again once or twice pinnated with smaller branches, which are either simple and lanceolate or cuneate and forked; or furnished, in place of branchlets, with solitary or tufted receptacles. All the divisions of the frond are very much attenuated at base, and more or less acute at the apex. *Vesicles* one to two inches long, oval-oblong, formed at intervals in the principal stem and branches; rarely absent. *Receptacles* springing from the axils of the marginal teeth, ovate, raised on slender stalks, from half an inch to upwards of an inch in length, bright yellow when ripe, two or more often issuing from the same point. These contain, in some individuals, *antheridia*, affixed to branching threads; in others, globose spores, which at length separate into four sporules. *Substance* exceedingly tough and leathery. *Colour* a dull, olive-green; which becomes black in drying.

This is the largest of the British species of the restricted genus *Fucus*, and by far the toughest and most rigid. Its substance is thicker and denser than that of any of the others, and its frequently pinnated habit, and remarkably large vesicles, added to the ribless frond, afford strong marks of distinction. When in fructification, the great abundance of the clear yellow receptacles contrasts agreeably with the colour of the other parts of the frond. Like most other submersed plants this varies in luxuriance according to the depth at which it grows: specimens near high-water mark being short and bushy, often exceedingly crowded in branches, and thickly covered with fruit; while those produced near ordinary low-water are drawn out to a great length, with more distant branches. The older authors founded varieties, which are scarcely worth noticing, on these differences.

Fucus nodosus is almost always more or less infested with *Polysiphonia fastigiata*, which forms globose tufts of a rich brown colour on various parts of its fronds. This parasite is not confined to the present species, however, but may often be seen on old stumps of *F. vesiculosus*, to which it generally attaches itself near the root only.

F. nodosus is one of those largely used in the manufacture of Kelp, which it yields in considerable quantities. Oystermen sometimes employ it to cover their oysters, though *F. serratus* is more generally employed for that purpose. In Scotland this plant is called *Sea-Whistles*; and boys make whistles of the larger air-vessels, according to Lightfoot, by cutting them across near one end.

Fig. 1. FUCUS NODOSUS; portion of a frond—*of the natural size.* 2. Segment of a receptacle:—*slightly magnified.* 3. A spore:—*highly magnified.*

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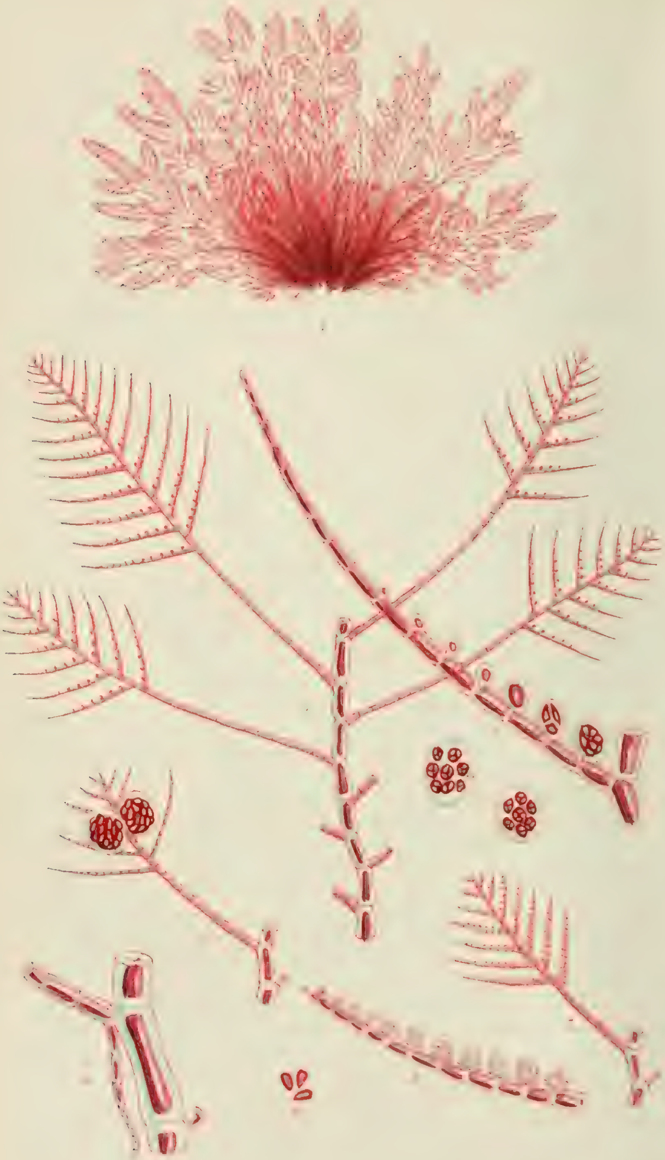
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Plate CLIX.

CALLITHAMNION BORRERI, *Ag.*

Gen. Char. *Frond* rosy, or brownish red, filamentous; stem either opake and cellular, or translucent and jointed; branches jointed, one-tubed, mostly pinnate (rarely dichotomous or irregular); dissepiments hyaline. *Fruit* of two kinds on distinct plants; 1, external *tetraspores*, scattered along the ultimate branchlets, or borne on little pedicels; 2, roundish or lobed, berry-like receptacles (*favellæ*) seated on the main branches, and containing numerous, angular spores. Callithamnion (*Lyngb.*),—from καλὸς, *beautiful*, and θαμνιον, a *little shrub.*

Callithamnion *Borreri*; much branched, sub-distichous, rigid or flaccid; branches set with distichous plumules which are bare of ramuli in their lower half, and simply pinnate in their upper; pinnæ long, patent, subulate, simple (or ramulose at top), the lowermost longest; articulations of the branches 2–5 times, of the pinnæ about twice as long as broad; tetraspores roundish, sessile on the inner face of the pinnæ; favellæ two-lobed, near the apex of the lesser branches.

Callithamnion Borreri, *Ag. Sp. Alg.* vol. ii. p. 170. *Harv. in Hook. Br. Fl.* vol. ii. p. 344. *Harv. Man.* p. 110. *Endl. 3rd Suppl.* p. 34. *Kütz. Phyc. Gen.* p. 372.

Callithamnion seminudum, *Ag. Bot. Zeit.* 1827. p. 637. *Ag. Sp. Alg.* vol. ii. p. 167. *Harv. in Hook. Br. Fl.* vol. ii. p. 344. *Wyatt, Alg. Danm.* no. 187. *J. Ag. Alg. Medit.* p. 72. *Endl. 3rd Suppl.* p. 34.

Ceramium pinnulatum, *Ag. Syst.* p. 139.

Ceramium miniatum, *Ag. Syst.* p. 141.

Conferva Borreri, *Sm. E. Bot.* t. 1741.

Hab. On mud-covered rocks near low-water mark. Annual. Summer. Rather rare. Yarmouth, *Mr. Borrer.* Torquay, *Mrs. Griffiths.* Sidmouth, *Miss Cutler.* Ilfracombe, Land's End, and Swansea, *Mr. Ralfs.* Falmouth, *Miss Warren.* Remarkably fine at Plymouth, *Rev. W. S. Hore, Mr. Rohloff,* and *Dr. Cocks.* Clontarf, *Miss Ball.* Howth, *Miss Gower.*

Geogr. Distr. Atlantic shores of France and Spain. Mediterranean and Adriatic Seas.

Descr. *Fronds* densely tufted, from one to four or five inches in height, the larger specimens excessively branched, capillary, many times divided in an alternately pinnate manner; branches more or less distichous, long, clothed with three or four series of lesser branches, the last of which are set with alternate, distichous plumules, from a quarter to nearly half an inch in length. *Plumules* issuing at almost every joint, alternate, patent, slender, naked in the lower part to a point beyond their middle; the upper half pinnate, a pinna issuing from every joint. *Pinnæ* alternate, subulate, the lowest longest, the rest gradually shorter to the apex. On luxuriant specimens I have frequently observed slender, root-like fibres to issue from the lowest joint of a plumule (fig. 9). *Articulations* of the stem from three to five times longer than broad, with a wide limbus, and narrow bag of endochrome, destitute of veins: articulations of the lesser branches and ramuli about twice as long as broad. *Tetraspores* roundish, sessile on the inner face of the pinnæ, one or several on each pinna; sometimes containing *eight* grains, each of which at maturity separates into four pieces (and becomes a tetraspore! [fig. 4]). On some individuals the place of tetraspores is supplied by clusters of hyaline cells, collected in dichotomous threads, which are supposed to be *antheridia* (fig. 7, 8). *Favellæ* (fig. 5) two-lobed, containing many large grains. *Colour*, a fine deep lake, or rosy-red, brownish toward the base: staining fresh water carmine. *Substance* rather rigid when fresh, soon becoming flaccid, and closely adhering to paper.

This very handsome species, whose essential character consists in having the lower half of its plumules bare of ramuli, while the upper is pinnated, the pinnæ spreading like the rays of a fan, was first discovered, about forty years ago, by Mr. Borrer of Henfield, who has added so much to our knowledge of British Botany, and whose zeal in the pursuit of his favourite science is still as ardent as ever. This, one of his early discoveries in a tribe of plants which he very successfully studied, has been consecrated to his honour by Sir James E. Smith.

It is nearly related to several other species, especially to *C. roseum*, *C. polyspermum*, and *C. tripinnatum*; from the two former of which it is known by the shape of its plumules, from the latter, chiefly by the absence of the axillary ramulus. Unlike as, at first sight, this plant may appear to *C. gracillimum*, very luxuriant specimens closely resemble that species in habit, and exhibit a nearer approach in microscopic character than could be supposed. I unhesitatingly refer Agardh's *C. seminudum*, which I have received from that author himself, as well as from several other continental friends, to our *Borreri*: they are undistinguishable. The noblest specimens of this species which I have seen, are those sent to me by my kind friends at Plymouth, to whose liberality I am indebted for a bounteous supply. On some of these I have observed, (and Mrs. Griffiths has, independently, made the same observation,) that the *tetraspores*, so called, contain *eight* sporules, and that each of these at maturity becomes a *tetrasporule*! On other individuals from the same locality we find the place of tetraspores supplied by those little tufts of glassy cells which, in this genus, obtain the name of *antheridia*.

Fig. 1. Callithamnion Borreri:—*of the natural size*. 2. Part of a branch with plumules. 3. A pinna with tetraspores. 4. Compound tetraspores. 5. A ramulus with favella. 6. Spores from the same. 7. A plumule with antheridia. 8. Pinna of the same. 9. Joints of a main branch, with radicular process:—*all more or less magnified*.

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Plate CLX.

PLATE CLX.

SCHIZOTHRIX CRESSWELLII, *Harv.*

GEN. CHAR. "*Filaments* involved in a thick, lamellar sheath, rigid, curled, thickened at the base, at length longitudinally divided. *Spermatia* lateral." *Kütz.* SCHIZOTHRIX (*Kütz.*),—from σχιζω, to *divide,* and θριξ, a *hair: hair-splitter.*

SCHIZOTHRIX *Cresswellii;* forming dense, soft, pulvinate, convex tufts; filaments very slender, curved, fastigiate, collected into branching bundles.

SCHIZOTHRIX Cresswellii, *Harv. in Herb.* (1846.)

CALOTHRIX Cresswellii, *Harv. Phyc. Brit. sub Tab.* 76 *in not.*

HAB. On sandstone maritime rocks, near high-water mark, exposed to the drip of fresh water. Annual. Winter. Near the Picket rock, Sidmouth, *Rev. R. Cresswell.*

GEOGR. DISTR. South coast of England.

DESCR. *Spreading* over the surface of soft sandstone rocks, in continuous, convex, roundish or oval patches, which run one into another, and cover the rock for spaces several inches in diameter, in a more or less regular manner. *Patches* or tufts one or two inches long, half an inch high (or thick), soft, somewhat slimy, composed of very slender, yellowish or greenish-olive, hyaline filaments, collected into dense, rope-like, branching bundles. *Bundles* fastigiate. *Filaments* exceedingly slender, once or twice divided in a dichotomous manner, apparently by a splitting of the original tube or cell. *Substance* soft, closely adhering to paper, but not glossy when dry. *Colour,* a greenish olive.

In the remarks under Plate LXXVI. of the first volume, I mentioned that I had received from the Rev. R. Cresswell of Salcombe Regis, what I regarded as a new species of *Calothrix,* and proposed to dedicate it to him by the name *Cresswellii.* On communicating a specimen, shortly afterwards, to Professor Kützing, I was informed by that author that it belonged to his recently instituted genus *Schizothrix,* of which it appeared to be a new and very distinct species. This genus is closely related to *Calothrix,* from which it differs chiefly in the mode of increase of its filaments, which divide at maturity in a dichotomous manner. I am not very sure, however, that there may not be some optical delusion in this matter, and offer the third figure in the plate with some hesitation. In habit this plant bears considerable resemblance to one of the larger species of *Rivularia*, especially to some of the fresh-water kinds, or those that inhabit dripping rocks: localities very similar to what our *Schizothrix* delights in. But the nature of its filaments, the absence of the basal globule, and of the firm gelatinous matrix, afford sufficient characters to separate it from any of the *Rivulariæ*.

Mr. Cresswell states that the *Schizothrix* grows at the very top of high-water mark, in situations where it is exposed to the continual drip of fresh water falling from high mural cliffs, and that it is most luxuriant where the drip falls from the greatest height, which in the station observed is about fifty feet. In this locality, where only this curious plant has yet been found, it occurs in considerable quantity, extending for upwards of twenty yards along the surface of a projecting piece of the cliff. It commences to grow late in the autumn, and is in perfection in November.

I have peculiar pleasure in dedicating this species to its discoverer, who has explored with much zeal and ability the botany of his neighbourhood, not omitting the more minute Algæ, which too commonly escape the notice of mere *collectors*. I am indebted to him for many specimens of the rarer kinds, and for excellent observations on several of them; and we may anticipate much interesting information from experiments which he has commenced on the growth of Sea-weeds, in closed bottles of sea-water. Already, he writes in a recent letter, he has succeeded perfectly with *Bryopsis plumosa*, which, in the space of a month, "has grown considerably, and is now putting out beautiful side branches." This subject deserves more attention. I may mention that I have myself a plant of *Griffithsia setacea*, inclosed in April 1846, which is now (Feb. 1848) in perfect health; that the water in the bottle has never been changed, and is as pure as when the plant was inclosed in it. No care has been taken of this plant, which stands on a library shelf.

Fig. 1. SCHIZOTHRIX CRESSWELLII; tufts, *in situ*:—*of the natural size*. 2. Bundles of filaments:—*magnified*. 3. Portion of two filaments:—*highly magnified*.

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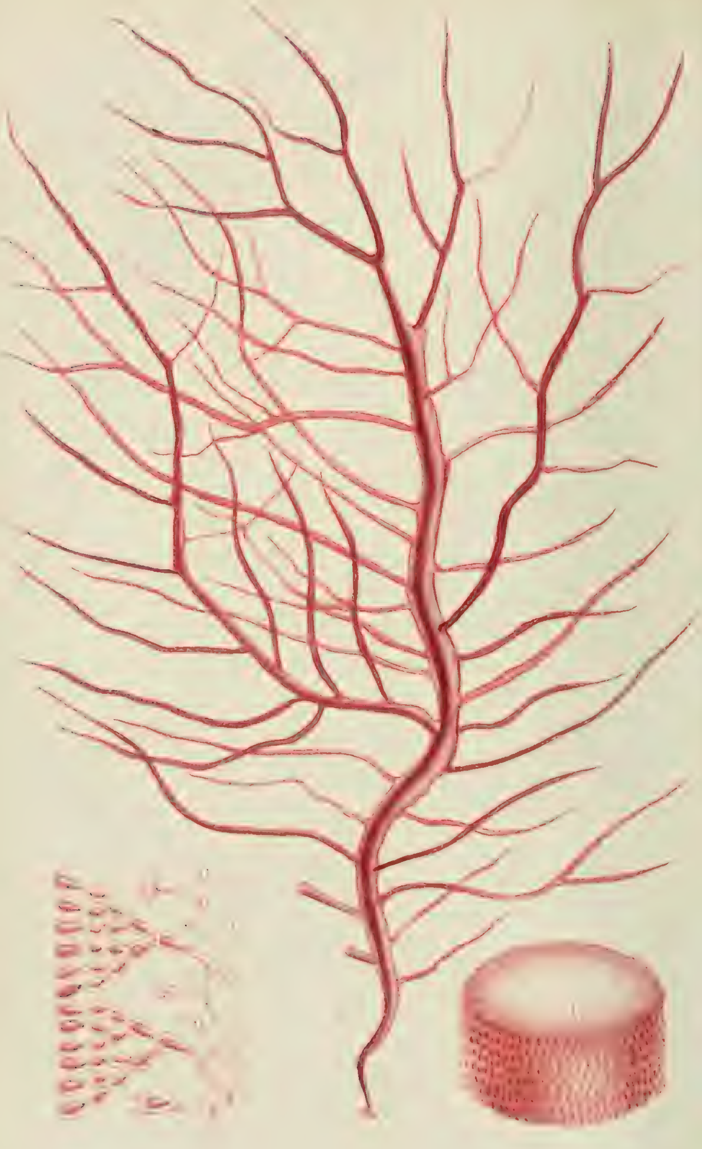

Plate CLXI.

NEMALEON? PURPUREUM, *Chauv.*

Gen. Char. *Fronds* cylindrical, gelatinoso-cartilaginous, elastic, solid; *axis* columnar, dense, composed of closely-packed, longitudinal, interlaced filaments; the *periphery* of elongated, horizontal, dichotomous filaments, whose ultimate ramuli are moniliform and coloured. *Fructification;* globular masses of spores (*favellidia*), attached to the filaments of the periphery. Nemaleon (*Tozzetti*),—from νημα, a *thread,* and ληιον, a *crop: crop of threads.*

Nemaleon *purpureum*; stem undivided, attenuated at base and apex, set with numerous, irregularly inserted, elongated, simple, tapering branches, which are either naked, or furnished with a second series of similar branches.

Nemaleon purpureum, *Chauv. mem.* p. 57.

Mesogloia purpurea, *Harv. in Hook. Br. Fl.* vol. ii. p. 386. *Harv. Man.* p. 48. *Wyatt, Alg. Danm.* no. 47.

Dumontia Calvadosii, *Lamour. Dict. D'Hist. Nat.* vol. v. p. 643. *Gaill. Dict. Sc. Nat.* vol. 53. p. 364. *Duby, Bot. Gall.* p. 941.

Hab. In sandy places, among *Zostera,* near low-water mark. Annual. Summer. Rare. Sidmouth and Torquay, *Mrs. Griffiths* and *Miss Cutler.* Whitsand Bay, *Rev. W. S. Hore.* Kilkee and Miltown Malbay, *W. H. H.* Balbriggan, *Miss Gower.*

Geogr. Distr. Atlantic coasts of France.

Descr. *Root,* a minute, conical disc. *Frond* from eight inches to two feet or more in length, slender at the base, gradually widening to a diameter of two to three lines in the middle, and thence gradually tapering upwards into a long, slender point, mostly undivided, or sometimes forked or trifurcate at the extremity, set throughout its length with alternate or opposite irregularly inserted lateral branches. *Branches* closely placed, patent, constricted at base, flexuous, very long, drawn out into a long, slender point, generally quite naked, or, in large specimens, furnished with a second series of smaller and more slender branches. All the apices much attenuated and acute. The *axis* is composed of rather laxly interwoven, colourless, branching, longitudinal threads, which throw out on all sides to the circumference, horizontal, dichotomous, coloured, moniliform filaments, with elliptical or pyriform joints. Under the microscope, the branches appear as if thickly studded with convex, coloured cells, (the apices of the filaments of the periphery,) separated by pellucid spaces. *Colour* varying from a fine deep purple red to a dull pink, rapidly given out in fresh water, and becoming browner in drying. *Substance* tender, gelatinous, and slippery, but not very elastic. *Fructification* (imperfectly known), consisting of masses of spores, seated among the filaments of the periphery.

M. Chauvin of Caen, in his excellent "*Recherches,*"* gives a history of this plant, from which it appears that it was known to the naturalists of France under the name of *Dumontia Calvadosii*, long before it was noticed on the shores of the British Islands. I was not aware of this fact, when, in 1832, I described, under the name of *Mesogloia purpurea*, specimens which were collected by Mrs. Griffiths, in the autumn of 1828, at Sidmouth. The resemblance to *Dumontia* is only an outward one; the structure is completely that of the *Gloiocladieæ*, and not very unlike that of *Mesogloia vermicularis*, though, according to our present systematic arrangement, these plants belong to different genera, and even to different families. In altering the genus of this plant, M. Chauvin had the option of restoring the specific name under which it was first described, but he has not thought fit to do so.

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* Recherches sur l'organization, la fructification, et la classification de plusieurs genres d'Algues, avec la description de quelques espèces inédites ou peu connues.—*Caen,* 1842.

The *structure* of this species differs considerably from that of *N. multifidum* (already figured at Plate XXXVI.), and probably may justify the future formation of a genus, when the fructification of both plants shall be more perfectly known. In our *N. purpureum*, the axis is composed of much more laxly set filaments; while those of the periphery are less branched, shorter, and composed of very large, pear-shaped cells. Seen under a lens of low power, the branches appear like tubes of glass, densely covered with brilliant purple studs.

Nemaleon purpureum is a rare species on the British shores, though occasionally thrown up in considerable quantities. This occurred at Sidmouth when Mrs. Griffiths first found the plant, but for several succeeding years it did not make its appearance. The specimens then collected were also of a much brighter colour, as well as larger and more luxuriant, than any which have been sent to me from other stations, or than I have myself gathered. I once found it growing on sandy ground near low-water mark; but it is more usually seen among rejectamenta after a gale.

Fig. 1. NEMALEON? PURPUREUM:—*of the natural size.* 2. Portion of a branch:—*moderately magnified.* 3. Some of the filaments, composing the same:—*highly magnified.*

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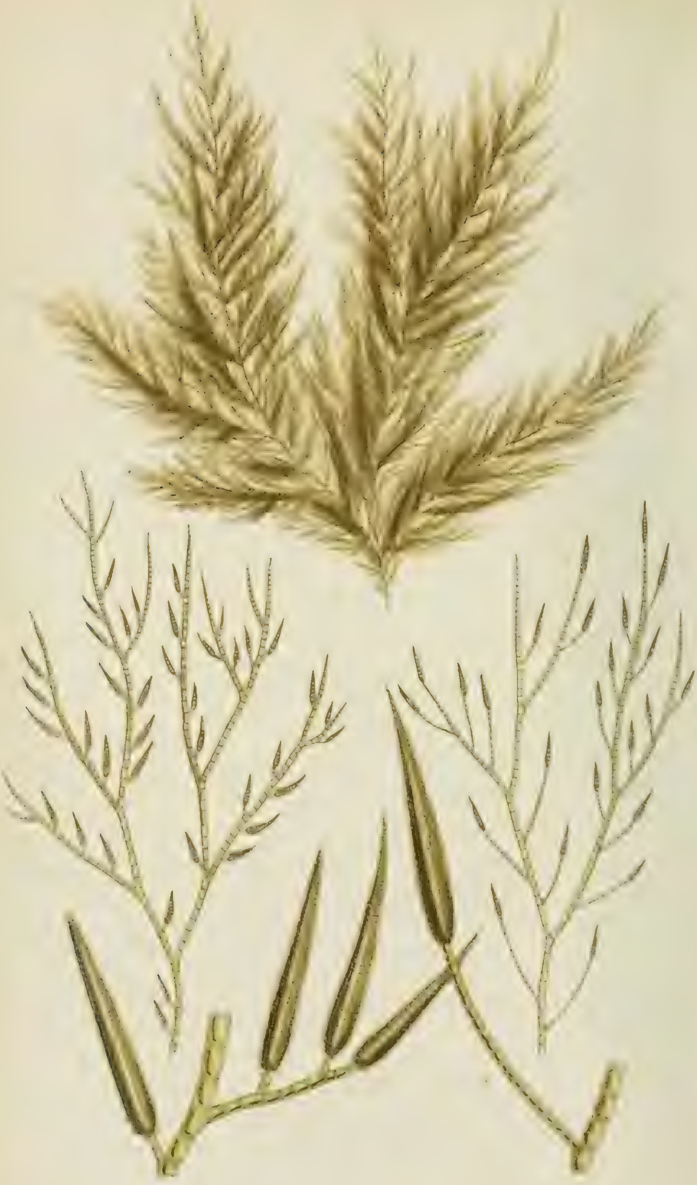

PLATE CLXII.

ECTOCARPUS SILICULOSUS,* *Lyngb.*

GEN. CHAR. *Frond* capillary, jointed, olive or brown, flaccid, single-tubed. *Fruit* either spherical, elliptical, or lanceolate *utricles* (or *spores*), borne on the ramuli, or imbedded in their substance. ECTOCARPUS (*Lyngb.*),—from εκτος, *external*, and καρπος, *fruit*.

ECTOCARPUS *siliculosus*; tufts yellowish or pale olive green, gelatinous, soft; filaments very slender, excessively branched; ultimate branchlets alternate or secund, attenuated; utricles stalked, subulate, attenuated to a fine point.

ECTOCARPUS siliculosus, *Lyngb. Hyd. Dan.* p. 131. t. 43. *Ag. Syst.* p. 161. *Grev. Fl. Edin.* p. 314. *Ag. Sp. Alg.* vol. ii. p. 37. *Harv. in Hook. Br. Fl.* vol. ii. p. 325. *Harv. in Mack. Fl. Hib.* part 3. p. 181. *Harv. Man.* p. 40. *Wyatt, Alg. Danm.* no. 172. *J. Ag. Alg. Medit.* p. 26. *Endl. 3rd Suppl.* 21. *Kütz. Phyc. Gen.* p. 288.

CERAMIUM siliculosum, *Ag. Syn.* p. 65. *Hook. Fl. Scot.* part 2. p. 86.

CERAMIUM confervoides, *Roth, Cat.* vol. i. p. 151. t. 8. f. 3. and vol. iii. p. 148.

CONFERVA siliculosa, *Dillw. Syn.* no. 112. t. E. *Sm. Eng. Bot.* t. 2319.

β. *longipes*; stalks of the utricles very long.

HAB. Parasitical on various marine Algæ, between tide marks, and in three to four fathom water. Annual. Spring to Autumn. Very common. β. at Jersey, *Miss White*.

GEOGR. DISTR. Atlantic shores of Europe and North America. Mediterranean Sea.

DESCR. *Filaments* from three to eighteen inches long, densely tufted and excessively branched, very slender, the main branches more or less entangled together, in old specimens especially, into slender rope-like bundles, the lesser branches free, spreading on all sides, long, and set with feathery branchlets furnished with lateral byssoid ramuli. *Branches* and *ramuli* alternate, or subsecund, issuing at acute angles; the latter long, and tapering to a point. *Joints* from once and a half to twice as long as broad, pellucid. *Utricles* broadly subulate, or somewhat lanceolate, closely transversely striate, tapering to a fine point, and occasionally produced at the apex into a hyaline filament. In our var. β. (fig. 4, 5.) the utricles are borne on very long stalks, but not otherwise different. *Substance* very soft, somewhat gelatinous, soon decomposing, closely adhering to paper in drying; sometimes more harsh and coarser. *Colour* varying from olive green to yellowish or brown.

* * *

This is one of the commonest species of *Ectocarpus* in the waters of Europe, and is more generally dispersed than most others of the genus. Formerly it was confounded with *E. littoralis*, and is still, by many botanists, regarded as merely a state of that species. The branching and general habit of the two plants are very similar. *E. siliculosus* is, however, usually more slender, more gelatinous, softer, and more feathery in its ramification. A more absolute distinction lies in the difference of the *fruit*, which is here a lanceolate pod, while in *E. littoralis* one or more spores are immersed in the branches, where they sometimes form strings. Those who regard the two plants as states of one species, affirm that the pod-like fruit of the present is merely a *secondary* fruit, proving nothing. This view, after as careful consideration as I can give the subject, I am not disposed to adopt, at least, not until some more convincing arguments shall be brought forward, than its advocates have yet offered.

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* Erroneously printed *reticulosus*, in the list given at the end of our first volume.

The specimen of which a magnified portion is represented at fig. 5, and on which our var. β is founded, was sent to me from Jersey by Miss White. In its general aspect and in ramification, it resembles the common *E. siliculosus*, but is remarkable for having its pods raised on very long peduncles, or, in other words, terminating the branches and ramuli. I am not aware that this variety has been previously noticed, nor have I seen a second specimen of it. Whether it be one of the one hundred and thirty new species of *Ectocarpus* which, I am informed, Prof. Meneghini has proposed, I am unable to say, not having received the Fifth Part of that author's work.

Fig. 1. ECTOCARPUS SILICULOSUS :—*of the natural size.* 2. A branch of var. *a*. 3. Utricles from the same. 4. A branch of var. β. 5. Utricle from the same :—*all more or less highly magnified.*

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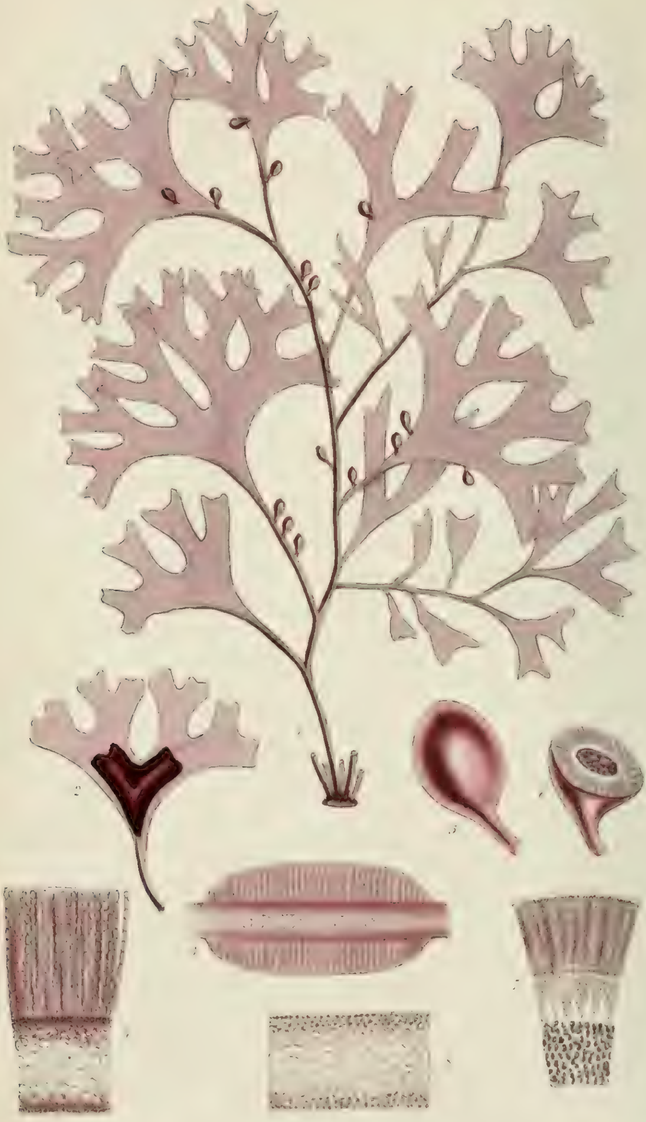

W.H.H. del. et lith.

Reeve, Benham & Reeve, imp.

PLATE CLXIII.

PHYLLOPHORA MEMBRANIFOLIA, *J. Ag.*

GEN. CHAR. *Fronds* stipitate, rigid-membranaceous, proliferous, nerveless, or with a vanishing nerve, cellular; cells minute, angular, gradually smaller towards the surface. *Fructification*; 1, *tubercles* (*favellidia*) scattered over the frond, containing masses of minute spores; 2, *warts* (*nemathecia*) seated on the frond, composed of radiating, moniliform filaments, whose lower articulations are at length converted into spores? 3, *tetraspores* (on distinct plants) collected into sori, either towards the apex of the frond, or in proper leaflets. PHYLLOPHORA (*Grev.*),—φυλλον, a *leaf*, and φορεω, to *bear*.

PHYLLOPHORA *membranifolia*; stem cylindrical, filiform, branched; the branches expanding into broadly wedge-shaped, two-lobed or dichotomous segments; tubercles oval, on short stalks arising from the stem or leaflets; nemathecia forming broad patches in the centre of the leaflets.

PHYLLOPHORA membranifolia, *J. Ag. Alg. Medit.* p. 93. *Endl. 3rd Suppl.* p. 38.

RHODYMENIA membranifolia, *Harv. in Phyc. Br. Syst. list*, p. xii.

CHONDRUS membranifolius, *Grev. Alg. Brit.* p. 131. *Hook. Br. Fl.* vol. ii. p. 302. *Harv. in Mack. Fl. Hib.* part 3. p. 202. *Wyatt, Alg. Danm.* no. 76. *Harv. Man.* p. 78.

SPHÆROCOCCUS membranifolius, *Ag. Syn.* p. 26. *Lyngb. Hyd. Dan.* p. 10. t. 3. *Ag. Sp. Alg.* vol. i. p. 240. *Ag. Syst.* p. 214. *Hook. Fl. Scot.* part 2. p. 102. *Grev. Fl. Edin.* p. 295. *Spreng. Syst. Veg.* vol. iv. p. 335.

FUCUS membranifolius, *Good. and Woodw. Lin. Trans.* vol. iii. p. 120. t. 16. f. 1. *Lam. Diss.* t. 20, 21. f. 3. *Turn. Syn.* p. 25. *Turn. Hist.* t. 74. *Sm. E. Bot.* t. 1965. *Stack. Ner. Brit.* t. 20.

FUCUS fimbriatus, *Huds. Fl. Angl.* p. 574.

HAB. On rocks and stones, between tide-marks. Perennial. Winter. Very common on the British coasts.

GEOGR. DISTR. Atlantic shores of Europe and North America.

DESCR. *Root* a spreading callus. *Fronds* densely tufted, from three to twelve inches in height. *Stem* slender, as thick as small twine, rigid, cylindrical, repeatedly branched in an irregularly dichotomous manner; branches simple, or bifid, one, two, or more inches in length, spreading, gradually becoming compressed upwards, and expanding into a wedge-shaped, or fan-shaped, more or less divided frondlet. *Frondlets* rigid-membranous, repeatedly dichotomous, the axils and apices obtuse, the latter sometimes bifid. In old specimens, besides the terminal frondlet, the branches give off very numerous lateral ones of a smaller size, which are simply bifid, and of a narrow wedge-shaped outline: the abundance of these sometimes makes the specimen very bushy. *Apices* fastigiate. *Fructi-*

fication: 1, roundish or oval, opake *tubercles* borne on short stalks, which spring irregularly from the sides of the stem, and from the lower parts of the frondlets, containing, beneath a thick coat formed of closely packed filaments, a dense mass of minute spores. 2, dark-red, thickened, wart-like patches of irregular form and size, occupying the disk of the frondlet, and prominent on both surfaces, composed of moniliform filaments. These are usually found on distinct plants, but sometimes occur on those which also bear tubercles. *Tetraspores* unknown (to me). *Colour* of the frond, a deep brownish or livid purple-red; passing to greenish and whitish in decay. *Substance* rigid, somewhat cartilaginous, and thin, very tough.

This plant bears a considerable resemblance in form to *Rhodymenia Palmetta*, and still more to the *R. flabellifera* of the Southern Ocean, but the colour and the fructification, so far as the latter is known, are very different: and I agree with my valued friend Mrs. Griffiths in regarding this as a species of *Phyllophora*, nearly related to *P. Brodiæi*. In the list given at the end of our first volume a different place has been inadvertently assigned to it.

I am not aware that *tetraspores* have yet been noticed on *P. membranifolia*. The swellings of the periphery which are called *nemathecia*, and which, in their dark colour, and the high organization of their tissue, seem to be connected with fructification, are not uncommonly formed. They usually occur on individuals which do not produce tubercles; but Mrs. Griffiths once found a specimen, a part of which she has kindly communicated to me, which bears both tubercles and nemathecia. This, though a rare occurrence, is not to be wondered at, because these organs have really much resemblance to each other in structure; so much so that it is probable that one is but a metamorphic form of the other, or, at least, is an organ of an analogous nature.

Fig. 1. PHYLLOPHORA MEMBRANIFOLIA. 2. A frondlet, with *nemathecium*:—*both of the natural size.* 3. Vertical section of a *nemathecium*. 4. Part of the same. 5. A tubercle. 6. The same, cut across. 7. Part of a vertical section of the same. 8. Section of the frond:—*all more or less highly magnified.*

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Plate CLXIV.

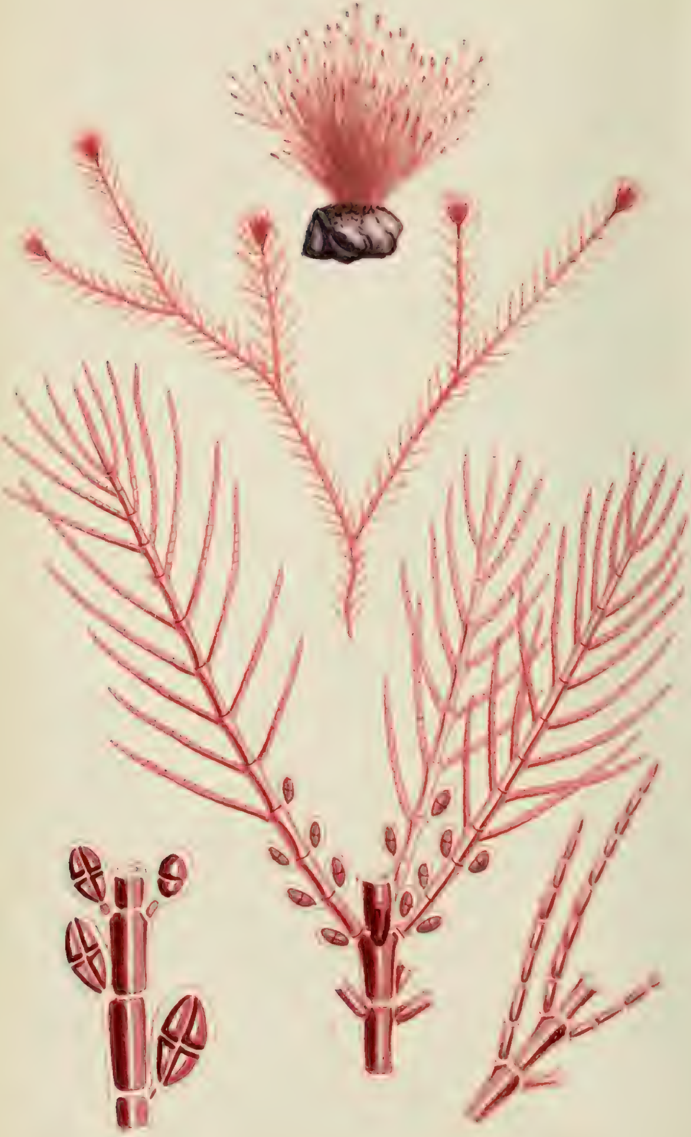

PLATE CLXIV.

CALLITHAMNION CRUCIATUM, *Ag.*

GEN. CHAR. *Frond* rosy, or brownish-red, filamentous; stem either opake and cellular, or translucent and jointed; branches jointed, one-tubed, mostly pinnate, (rarely dichotomous or irregular); dissepiments hyaline. *Fruit* of two kinds on distinct plants; 1, external *tetraspores,* scattered along the ultimate branchlets, or borne on little pedicels; 2, roundish or lobed, berry-like receptacles (*favellæ*) seated on the main branches, and containing numerous, angular spores. CALLITHAMNION (*Lyngb.*),—from καλος, *beautiful,* and θαμνιον, a *little shrub.*

CALLITHAMNION *cruciatum*; filaments densely tufted, irregularly and rather sparingly branched; branches alternately divided, jointed, furnished at each joint with two to four opposite or quaternate, slender, short pectinato-pinnate ramuli; tetraspores elliptical, subsessile, borne on the lowermost joints of the ramuli.

CALLITHAMNION cruciatum, *Ag. Syst. Alg.* vol. ii. p. 160. *Harv. in Hook. Br. Fl.* vol. ii. p. 339. *Wyatt, Alg. Danm.* no. 182. *Harv. Man.* p. 104. *J. Ag. Alg. Medit.* p. 70. *Endl. 3rd Suppl.* p. 34. *Hook. fil. et Harv. in Lond. Journ.* vol. vi. p. 412.

β *pumilum*; much smaller, the ramuli more dense, and the joints shorter.

CALLITHAMNION cruciatum, β pumilum, *Harv. Man.* p. 104.

CALLITHAMNION pumilum, *Harv. in Hook. Br. Fl.* vol. ii. p. 339. *Endl. 3rd Suppl.* p. 34. *Harv. in Mack. Fl. Hib.* part 3. p. 213.

HAB. On mud-covered rocks, near low water mark. Annual. Summer. Rather rare. Pier, Torquay, *Mrs. Griffiths.* Salcombe, *Mrs. Wyatt.* Milford Haven, *Mr. Ralfs.* Plymouth, *Rev. W. S. Hore.* Cork Harbour, *Dr. J. R. Harvey.* Coast of Down, *Mr. W. Thompson.* Ferriter's Cove, Kerry, *Mr. W. Andrews.* β, Miltown Malbay, *W. H. H.*

GEOGR. DISTR. Atlantic shores of France and Spain. Mediterranean and Adriatic Seas. Tasmania, *Mr. Gunn.*

DESCR. *Filaments* one to two inches long, capillary, flaccid, densely tufted, sparingly branched in an irregular manner. *Branches* mostly alternately divided, the lesser divisions furnished with short lateral branchlets, jointed; each joint throughout the whole length of the plant furnished with slender opposite or quaternate and cruciate ramuli. *Ramuli* not more than half the diameter of the branches, from half a line to nearly a line long, erecto-patent, straight, pectinato-pinnate; the pinnulæ opposite, very slender, cylindrical, not greatly tapering to the point. *Apices* of the branches darkened, owing to the crowding of the terminal ramuli. *Articulations* of the stem and branches from two to four times as long as broad; of the ramuli twice or thrice; and of the pinnulæ about twice as long as broad: the dissepiments somewhat contracted. *Tetraspores* formed by the metamorphosis of the lowermost pinnulæ, sessile or subpedicellate, elliptical, cruciately divided, with a rather narrow limbus. *Favellæ* I have not seen. *Colour* a brownish-red. *Substance* flaccid. The plant adheres closely to paper, and is apt to decompose if wetted after once it has been dried.

A very distinct and beautiful species of this charming genus, and one which is very widely distributed. It was first noticed in the Mediterranean, from whence I have received excellent specimens. Mrs. Griffiths added it to the British Flora nearly twenty years ago; and it has since been found on several parts of the English and Irish coasts. More recently Mr. Gunn has sent specimens from Tasmania exactly similar to our European plant, thus proving that it exists in the temperate regions of the Southern, as well as of the Northern Hemisphere. It is not subject to much variation, except of a very minor character. The opposite or quaternate pinnulated ramuli constantly mark it. In some individuals the joints of the stem are much shorter, the ramuli more dense, and the whole plant very small. These, before I was well acquainted with the variations of *C. cruciatum*, I was disposed to regard as a distinct species, which I described under the name of *pumilum*, in the British Flora. A better acquaintance with the species has shown that this view cannot be maintained. I have specimens from Torquay showing every gradation between the original *pumilum* and the normal state of the plant; and I have others which vary in an opposite direction —the joints being very long, and the ramuli distant and either simple or with very few pinnulæ. Such specimens show an approach to the rare *C. floccosum*, though abundantly different from any state of that beautiful plant. An excellent mark for *C. cruciatum*, by which it may be known at a glance, lies in the very dense tufts terminating the branches, consisting of undeveloped ramuli.

Fig. 1. CALLITHAMNION CRUCIATUM; a tuft:—*of the natural size.* 2. Part of a branch, clothed with ramuli. 3. Portion, with fertile ramuli. 4. Tetraspores, *in situ.* 5. Uppermost pinnulæ:—*all more or less highly magnified.*

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Plate CLXV.

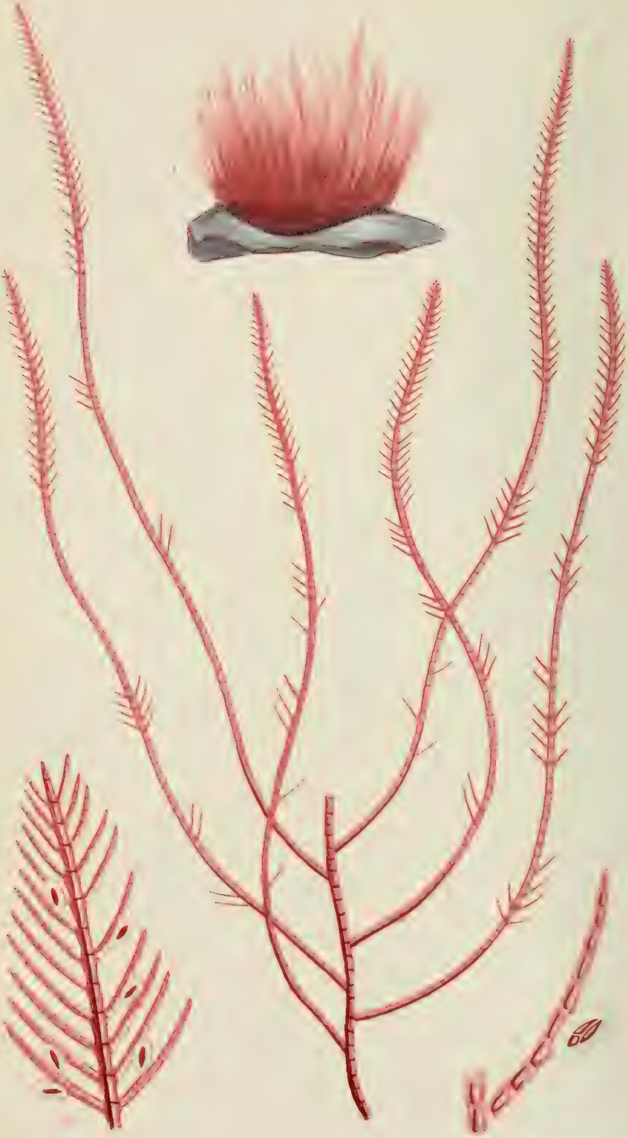

PLATE CLXV.

CALLITHAMNION BARBATUM, *Ag.*

GEN. CHAR. *Frond* rosy or brownish red, filamentous; stem either opake and cellular, or translucent and jointed; branches jointed, one-tubed, mostly pinnate (rarely dichotomous or irregular); dissepiments hyaline. *Fruit* of two kinds on distinct plants; 1, external *tetraspores*, scattered along the ultimate branchlets, or borne on little pedicels; 2, roundish or lobed, berry-like receptacles (*favellæ*) seated on the main branches, and containing numerous angular spores. CALLITHAMNION (*Lyngb.*), —from *καλος, beautiful,* and *θαμνιον, a little shrub.*

CALLITHAMNION *barbatum*; stems (rising from creeping filaments?) much and irregularly branched; branches mostly alternate, long, subsimple, naked, or pinnulated with minute, opposite, spine-like, erecto-patent ramuli; articulations twice or thrice as long as broad; tetraspores elliptic oblong, with a wide limbus, sessile on the sides of the pinnulæ.

CALLITHAMNION barbatum, *Ag. Syst. Alg.* vol. ii. p. 181. *Harv. Man.* p. 114. *J. Ag. Alg. Medit.* p. 70. *Endl. 3rd Suppl.* p. 34. *E. Bot. Suppl.* t. 2889.

CALLITHAMNION Ralfsii, *Harv. in Herb.* (1838.)

HAB. On mud-covered rocks, in the sea, between tide-marks. Very rare. Perennial? Ilfracombe, and on the quay at Penzance, *Mr. Ralfs.* (1838.) Dredged at Weymouth, *Rev. M. J. Berkeley.*

GEOGR. DISTR. Mediterranean Sea.

DESCR. *Filaments* forming intricate tufts, densely matted together and apparently connected at base by creeping fibres, but difficult to disentangle; one to two inches high, much and irregularly branched; branches alternate or opposite, erect, long, simple, or bearing others similar to themselves, their upper half closely pinnulated with very short, opposite, spine-like, erecto-patent ramuli, their lower part either naked or irregularly pinnulated with similar ramuli. *Articulations* cylindrical, twice or thrice as long as broad. *Tetraspores* elliptic-oblong, with a very wide limbus, borne on the sides of the ramuli, sessile, mostly solitary. *Favellæ* unknown. *Substance* membranaceous and somewhat rigid, imperfectly adhering to paper. *Colour* a dull brownish-red, without gloss.

To the naked eye, this species, unless closely examined, resembles a ragged specimen of *C. floridulum*, though when compared under a lens with that plant the two are seen to be abundantly different. The short opposite ramuli which feather the ends of the branches of *C. barbatum*, and which are most abundant in summer specimens, though perhaps always to be found in degree, form the striking mark of the species. Yet these ramuli are not noticed by Agardh in the description which he has given, in his *Species Algarum*. It would, therefore, be very questionable whether our plant and his were identical had not *Mr. J. G. Agardh* seen and examined specimens of the British plant, and pronounced them to be similar to those described by his father. But for this evidence, which I suppose is conclusive, I should have regarded the plant now described as a novelty; and, indeed, until the specimens had been submitted to Mr. Agardh, I did so regard it, and had intended to dedicate it to its estimable discoverer in this country, by the name *C. Ralfsii*. Should future observations prove that the plant of the elder Agardh is really different (as I suspect may be the case) I hope that the name *Ralfsii* may be retained for our British plant. I have seen no specimens but those gathered by Mr. Ralfs in 1838; nor have I heard of the species having been met with by any one else, except Mr. Berkeley, on the British coast.

Fig. 1. CALLITHAMNION barbatum; tuft:—*of the natural size*. 2. Portion of a filament. 3. Apex of a branch, with tetraspores. 4. Ramulus and tetraspores:—*all more or less highly magnified*.

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PLATE CLXVI.

LITHOCYSTIS ALLMANNI, *Harv.*

GEN. CHAR. "Plant calcareous, consisting of a single plane of cellules, which are disposed in radiating dichotomous series forming an appressed flabelliform frond." *Allm.* LITHOCYSTIS (*Allm.*),—from λιθος, a *stone*, and κυστις, a *bladder*; because the cells are coated with a stony membrane.

LITHOCYSTIS *Allmanni.*

HAB. Parasitical on *Chrysymenia clavellosa,* from an Oyster-bed, Malahide, Dublin Bay, *Professor Allman.*

GEOGR. DISTR. —— ?

DESCR. "This minute Alga presents itself to the naked eye in the form of very small whitish dots scattered over the surface of the vegetable, which it has selected for its parasitic growth. Under the microscope each dot is seen to consist sometimes of one, but more frequently of a cluster of several transparent and colourless flabelliform fronds, whose component cellules radiate from the apex of the frond, and after repeated dichotomous division, terminate by forming a convex margin. In almost all the cells there may be seen a very evident sphærical nucleus. The whole plant is brittle, and pulverisable under pressure, its hyaline frond being mainly composed of carbonate of lime, which does not merely incrust it, but is intimately incorporated with its tissues. In *Lithocystis,* indeed, the carbonate of lime would seem in every way to represent and replace the silica of the *Diatomaceæ.* Under the action of dilute acid the mineral matter is entirely dissolved, and nothing remains but an exceedingly delicate organic film, in which the original form of the plant can with difficulty be detected. Nothing distinctly referable to fructification has been seen in any of the specimens examined. *Lithocystis* manifestly approximates very closely to *Coleochæte,* a genus established by Brebisson for a fresh-water Alga, and one with which the *Phylactidium* of Kützing is evidently identical. Setting aside the sheathed bristles of *Coleochæte*—a character by no means constant—*Lithocystis* would appear to differ from the latter chiefly by its calcareous composition, a feature, however, of much importance, and plainly bringing the present plant into direct relation with the Corallines." *Allm.*

* * *

In one of the best books of the last generation written for the amusement and instruction of young persons,—I mean *Evenings at Home,*—there is an excellent paper, headed "Eyes and no Eyes, or the Art of Seeing." The history of the discovery of the curious and beautiful little plant here figured reminds me of that paper, offering, as it does, a striking illustration of the advantage to a naturalist of having his eye constantly on the watch. My friend Professor Allman, who omits no opportunity of adding an unobserved fact or a new member to biological science, noticed that an oyster-shell (found on a supper-table) was infested by some animal and vegetable parasites; among others, by some poor looking specimens of *Chrysymenia clavellosa*. On looking a little closer at these latter, he spied, what few but an observer so lynx-eyed would have discovered, some minute white dots, irregularly placed on the surface of the fronds. These he deemed worthy of examination, and laid aside the oyster-shell for that purpose. On submitting a fragment of the dotted *Chrysymenia* to the microscope the following day, the first trial rewarded him with a sight of the delicate, glassy fan which is here copied from his drawing. I have added a representation of the oyster-shell, as a memento of the discovery; recommending to all botanical oyster-eaters to make a similar use of their eyes.

The aspect of this little parasite is strikingly similar to that of a *Coleochæte*, but the calcareous nature of the cellular membrane seems to point to a different affinity. In the absence of information respecting its fructification, I can form but a guess as to the family in which it may most properly be arranged. In suggesting the *Corallineæ* I am chiefly guided by the calcareous tissue: the *habit*, indeed, is not unlike that of some of the minute *Melobesiæ*. The *structure* is much more simple, and, taking into account the stony nature of the cells, sufficiently peculiar to justify the formation of a new genus for the reception of this organism. For the genus Dr. Allman has suggested the appropriate name *Lithocystis*, and it affords me great pleasure to add the specific name *Allmanni*.

Fig. 1. An old oyster-shell, with various animal and vegetable parasites: *Lithocystis Allmanni*, forming white specks on the frond of *Chrysymenia clavellosa*.
2. Lithocystis Allmanni:—*highly magnified*.

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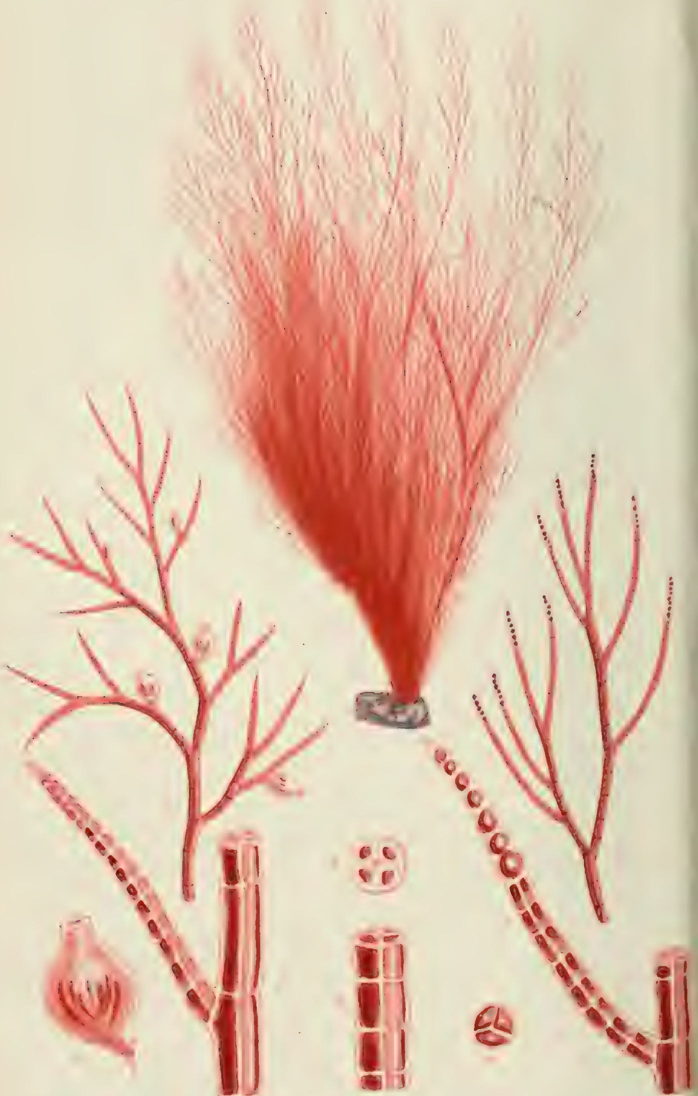

PLATE CLXVII.

POLYSIPHONIA URCEOLATA, *Grev.*

GEN. CHAR. *Frond* filamentous, partially or generally articulate; joints longitudinally striate, composed of numerous radiating cells or tubes, disposed round a central cavity. *Fructification* two-fold, on different individuals; 1, ovate *capsules* (*ceramidia*), furnished with a terminal pore, and containing a tuft of pear-shaped spores; 2, *tetraspores*, imbedded in swollen branchlets. POLYSIPHONIA (*Grev.*),—πολυς, *many*, and σιφων, a *tube*.

POLYSIPHONIA *urceolata*; filaments rigid, setaceous, full-red, much branched, loosely bundled; branches dichotomous, more or less furnished with short, alternate, patent or recurved ramuli; articulations marked with two broad tubes, those of the main branches 3–5 times longer than broad; siphons four, surrounding a minute cavity; capsules pitcher-shaped, with a produced mouth, generally stalked; tetraspores in the upper part of the ramuli.

POLYSIPHONIA urceolata, *Grev. Fl. Edin.* p. 309. *Harv. in Hook. Br. Fl.* vol. ii. p. 330. *Wyatt, Alg. Danm.* no. 133. *Harv. in Mack. Fl. Hib.* part 3. p. 207. *Harv. Man.* p. 95. *Endl. 3rd Suppl.* p. 45.

POLYSIPHONIA patens, *Harv. in Hook. Br. Fl.* vol. ii. p. 330. *Endl. 3rd Suppl.* p. 54.

HUTCHINSIA urceolata, *Hook. Fl. Scot.* vol. ii. p. 88. *Lyngb. Hyd. Dan.* p. 110. t. 34. *Ag. Syst.* p. 151. *Ag. Sp. Alg.* vol. ii. p. 70.

HUTCHINSIA patens, *Ag. Sp. Alg.* p. 71.

CONFERVA urceolata, *Dillw.* no. 156. t. G. *E. Bot.* t. 2365.

CONFERVA patens, *Dillw.* no. 157. t. G.

HAB. On rocks near low-water mark, and on the stems of *Laminaria digitata*. Annual Summer. Common on the shores of the British Islands.

GEOGR. DISTR. Atlantic shores of Northern Europe. Iceland. North America.

DESCR. *Fronds* densely tufted, often entangled at base, and connected by root-like fibres, from three to nine inches long, as thick as horsehair at base, gradually attenuated upwards, much and irregularly branched, often very bushy. Main branches somewhat dichotomous, more or less furnished with short, lateral, simple, or sparingly divided patent ramuli, which bear a few thorn-like, lesser divisions. Sometimes these thorn-like ramelli are very abundant, and hooked backwards, when the plant becomes *P. patens* of authors; at other times they are few and more erect. *Articulations* very different in different parts of the frond: those of the lower part of the stem about as long as broad; of the branches generally thrice, but sometimes five times as long; and of the ramuli, rather shorter than their breadth; all marked by two wide tubes, and exhibiting, when cut transversely, four siphons surrounding a minute cavity. *Capsules* on short stalks, elegantly urn-shaped. *Tetraspores* forming a row in the upper half of the ultimate ramuli, and generally extending to the apex. *Colour* a full, deep red, becoming much darker, and even black in drying. *Substance* rigid, not strongly adhering to paper.

Polysiphonia urceolata is subject to some minor variations, according to the locality in which it grows. When found on rocks, in exposed situations, near low-water mark, the filaments are more robust, of greater length, and much more branching; these constitute the typical form of the species, as restricted by Agardh. When growing on the stems of *Laminaria digitata* the filaments are much less branched, the lateral branches shorter, and the ramuli remarkably squarrose, often hooked backwards. Such specimens constitute the *P. patens* of Agardh, and are well represented in Lyngbye's figure quoted above. To the naked eye the extreme states of these two varieties are sufficiently characterised, but various intermediate forms insensibly connect them, and I have found it impossible to discover any satisfactory distinction between them. The *Conferva patens* of Dillwyn appears to be merely the young state of the plant.

Fig. 1. POLYSIPHONIA URCEOLATA; tuft:—*of the natural size.* 2. Branch with capsules. 3. A capsule. 4. Branch with tetraspores. 5. Ramulus from the same. 6. A tetraspore. 7. Portion of a branch and ramulus, to show the comparative length of the joints. 8. Portion of the lower part of the stem, to show the same. 9. Cross-section of a filament:—*all more or less highly magnified.*

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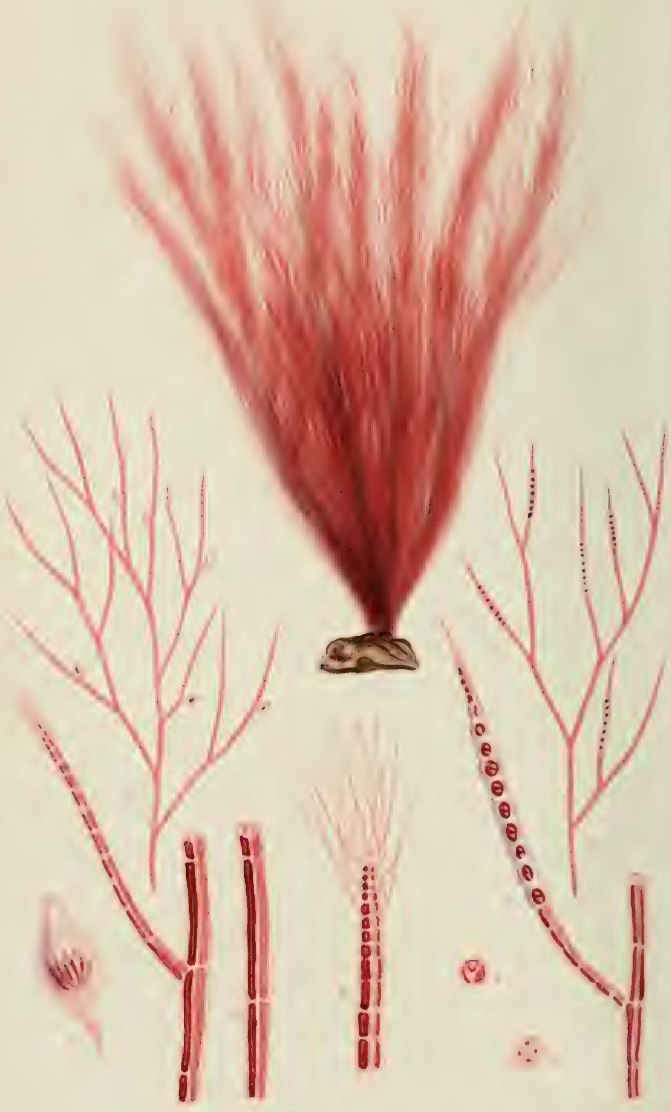

PLATE CLXVIII.

POLYSIPHONIA FORMOSA, *Suhr.*

GEN. CHAR. *Frond* filamentous, partially or generally articulate; joints longitudinally striate, composed of numerous radiating cells or tubes, disposed round a central cavity. *Fructification* two-fold, on different individuals; 1, ovate *capsules* (*ceramidia*) furnished with a terminal pore, and containing a tuft of pear-shaped spores; 2, *tetraspores,* imbedded in swollen branchlets. POLYSIPHONIA (*Grev.*), — from πολυς, *many,* and σιφων, a *tube.*

POLYSIPHONIA *formosa*; filaments exceedingly slender and flaccid, full-red, much divided; branches subdichotomous, long, flexuous, more or less furnished with scattered, spreading, alternate, subulate ramuli; articulations marked with two broad tubes, those of the main branches many times (5–10 times) longer than broad, of the ramuli short; siphons four, surrounding a minute cavity; capsules urceolate, generally stalked; tetraspores imbedded in the middle part of the ramuli.

POLYSIPHONIA formosa, *Suhr. Bot. Zeit.* 1831, p. 709. *Harv. Man.* p. 94. *Wyatt, Alg. Danm.* no. 216.

POLYSIPHONIA gracilis, *Grev. MSS.*

HAB. On rocks, near low-water mark. Annual. Summer. Not uncommon. Lerwick, Shetland, *Suhr.* Bute, *Dr. Greville.* Belfast Bay, *Mr. Thompson.* Antrim, *Mr. D. Moore.* Clontarf, *Miss Ball.* Galway, *Mr. M'Calla.* Malahide, *W.H.H.* River Dart, *Mrs. Griffiths.* Salcombe, *Mrs. Wyatt.* Plymouth, *Rev. W. S. Hore, and Dr. Cocks.* Whitsand Bay, *Dr. Jacob.* Sidmouth, *Rev. R. Cresswell.*

GEOGR. DISTR. Atlantic shores of Northern Europe. Baltic Sea.

DESCR. *Filaments* densely tufted, from six to ten inches in length, the larger specimens as slender as a human hair, the smaller and more delicate much more slender, excessively branched, in a manner between alternate and dichotomous; branches three or four inches long, flexuous, several times divided, the penultimate divisions more or less furnished with alternate, patent, subsimple ramuli, ultimate ramuli subulate, spreading. *Apices* blunt, and often clothed with byssoid fibres. *Articulations* very variable in different parts of the frond; those of the stem about twice as long as broad; of the main branches from eight to ten times; of the smaller branches from four to five times; and of the ramuli about once and half as long as broad. *Interstices* pellucid. *Capsules* urceolate, scattered on the sides of the upper ramuli. *Tetraspores* forming a line in the middle of the ramuli, which then become fusiform. *Colour* a full, deep, and somewhat pinky-red, becoming red-brown, or very dark, in drying. *Substance* flaccid, membranous, or, when young, somewhat gelatinous, closely adhering to paper, and somewhat glossy when dry.

This species is, as may be seen from the magnified figures in our plate, very closely related to the subject of the previous plate, and it is for this reason that I have figured them consecutively. *P. formosa* differs from *P. urceolata* chiefly in the much greater tenuity of its filaments, and the greater proportional length of its joints; it agrees with that species in its colour, its ramification and the peculiar form of its capsules. Were we merely to take into consideration the beautifully feathered and luxuriant specimens collected by Dr. Greville on the shores of Bute, and compare them with the coarse growing state of *P. urceolata* commonly met with, we should probably pronounce the two species to be broadly distinguished, and should anticipate no difficulty in determining between them. But it must be admitted that specimens do occur which show a much greater approach both in habit and character; and while I am unwilling to erase *P. formosa* from the list altogether, I am obliged to allow that I have seen individual specimens which it has puzzled me to say whether they ought to be referred to *urceolata* or *formosa*. When such perplexities meet us on the shore, one is apt to conclude that specific division has been carried too far. In the majority of cases, however, the limits are sufficiently marked. *P. formosa* appears to be a plant of bays and estuaries; *P. urceolata*, of the more exposed parts of the coast; and, whether we look on them as different species or as well-marked varieties of one species, they appear to be worthy of separate notice.

Fig. 1. POLYSIPHONIA FORMOSA; tuft:—*of the natural size.* 2. A branch with capsules. 3. A capsule. 4. A branch with tetraspores. 5. Ramulus of the same. 6. A tetraspore. 7. Portion of a branch, with ramulus. 8. Portion of a main branch. 9. Apex of a young ramulus, with byssoid fibres. 10. Cross section of the filament:—*all more or less highly magnified.*

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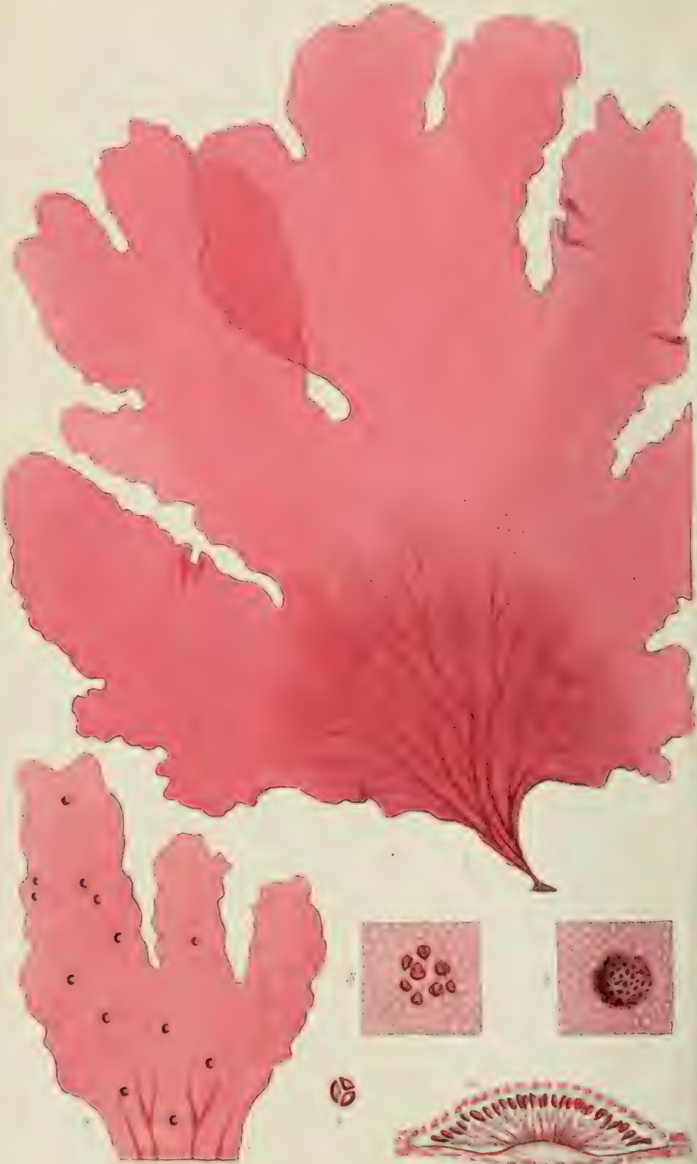
Plate CLXXV.



W. H. H. del. et lith.

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PLATE CLXIX.

NITOPHYLLUM HILLIÆ, *Grev.*

GEN. CHAR. *Frond* membranaceous, reticulated, rose-red, (rarely purplish) irregularly cleft, veinless, or furnished with irregular veins towards the base. *Fructification* two-fold, on distinct plants; 1, convex *tubercles* (*coccidia*) immersed in the frond, and containing a mass of spores; 2, *tetraspores* grouped into definite *sori*, or spots, variously scattered over the frond. NITOPHYLLUM (*Grev.*),—corruptly formed from *nitor*, to *shine*, and *φυλλον*, a *leaf*.

NITOPHYLLUM *Hilliæ*; frond thickish, but tender, veiny towards the base, of a roundish outline, very irregularly and more or less deeply cleft; the segments oblong, slightly waved, obtuse; spots of granules dot-like, very minute, densely scattered over the surface of the frond.

NITOPHYLLUM Hilliæ, *Grev. Alg. Brit.* p. 80.

NITOPHYLLUM ulvoideum, *Hook. Br. Fl.* vol. ii. p. 287. *Wyatt, Alg. Danm.* no. 16. *Harv. Man.* p. 57.

AGLAIOPHYLLUM Hilliæ, *Endl. 3rd Suppl.* p. 52.

DELESSERIA Hilliæ, *Grev. Crypt. Fl.* t. 351.

HAB. On the shady sides of deep, tidal pools, near low-water mark. Rare. Annual. Summer and autumn. Plymouth, *Miss Hill;* also *Messrs. Rohloff, Hore, and Cocks*. Torquay, *Mrs. Griffiths*. Whitsand Bay, *Dr. Jacobs*. Scilly Islands, *Miss White*. Mountsbay, *Mr. Ralfs*. Jersey, *Miss Turner*. Valentia, Ireland, *W. H. H.*

GEOGR. DISTR. Coast of France, rare.

DESCR. *Root* a small, conical callus. *Stem* from a line to nearly half an inch in length, cylindrical at base, compressed upwards, and rapidly expanding into a roundish or somewhat flabellate frond, from four to twelve or sixteen inches in length. Frond very irregularly divided; sometimes nearly simple, with a few shallow marginal lobes, or broad crenatures; sometimes deeply cleft, nearly to the base, into a few broad segments, lobed at the margin; and sometimes deeply cut into ribbon-like laciniæ, proliferous from the margin, and considerably waved and crisped. Through the lower part of the frond run numerous, branching, flexuous veins, which are more or less apparent in different specimens, sometimes being very faint, sometimes strongly marked; and rarely, if ever, wholly absent. *Tubercles* as large as turnip-seed, scattered, hemispherical, containing a tuft of moniliform filaments, fixed to a central placenta, and forming *spores* from their terminal articulations. *Tetraspores* grouped in minute, roundish or oblong, dot-like sori profusely scattered over the greater part of the frond. *Substance* rather thick, tender, semi-transparent, adhering to paper in drying, in which state the surface retains some gloss. *Colour*, when growing, a fine, deep-crimson; becoming rosy in old age; changing to orange in fresh water, and, when dry, acquiring a brownish tint.

I have thought it right to restore the specific name under which this fine species has been described by Dr. Greville, in preference to that of *ulvoideum*, which I adopted in the Manual, in deference to the authority of Sir W. Hooker, who, in the British Flora, regards *Nitophyllum Hilliæ* as identical with *Fucus ulvoides* of Turner. By a reference to the Historia Fucorum it will be seen that *Fucus ulvoides* was founded on specimens communicated by Miss Hutchins, whose locality is alone mentioned for the species; although in the remarks appended to the description, Mr. Turner speaks of other specimens, received from Miss Hill, which he was disposed to consider the same, and which were, no doubt, our *Hilliæ*. These are the specimens which Sir W. Hooker mentions in the British Flora, as existing in his Herbarium. But these specimens, on which Mr. Turner's mind was not fully decided, (otherwise he would have quoted Miss Hill's habitat in its proper place,) cannot be regarded as the *ulvoides* of that author, unless they can be shown to be identical with those collected by Miss Hutchin's, from which the figure and description were taken. In the absence of direct evidence, which an inspection of Mr. Turner's Herbarium could alone supply, I am forced to judge of Miss Hutchins's *ulvoides* by the figure and description; and these, I have no hesitation in saying, agree in all respects with *tubercle-fruited* individuals of *N. punctatum*, and are not characteristic of our *N. Hilliæ*. I think it is, therefore, clear that the *Fucus ulvoides* of Turner must be considered a synonym of *N. punctatum*; and if this be admitted, all will agree, and none more readily than Sir W. Hooker, that in dedicating the present species to the memory of Miss Hill, its discoverer, and one of the most acute and successful marine botanists of her day, Dr. Greville has but paid a well-earned tribute to departed worth.

Fig. 1. A frond of NITOPHYLLUM HILLIÆ, producing *tetraspores*. 2. Portion of a frond with *tubercles*:—*both of the natural size*. 3. Portion of the surface, with a *sorus*. 4. Tetraspores. 5. Portion of the surface with a tubercle. 6. Vertical section of the same:—*all more or less highly magnified*.

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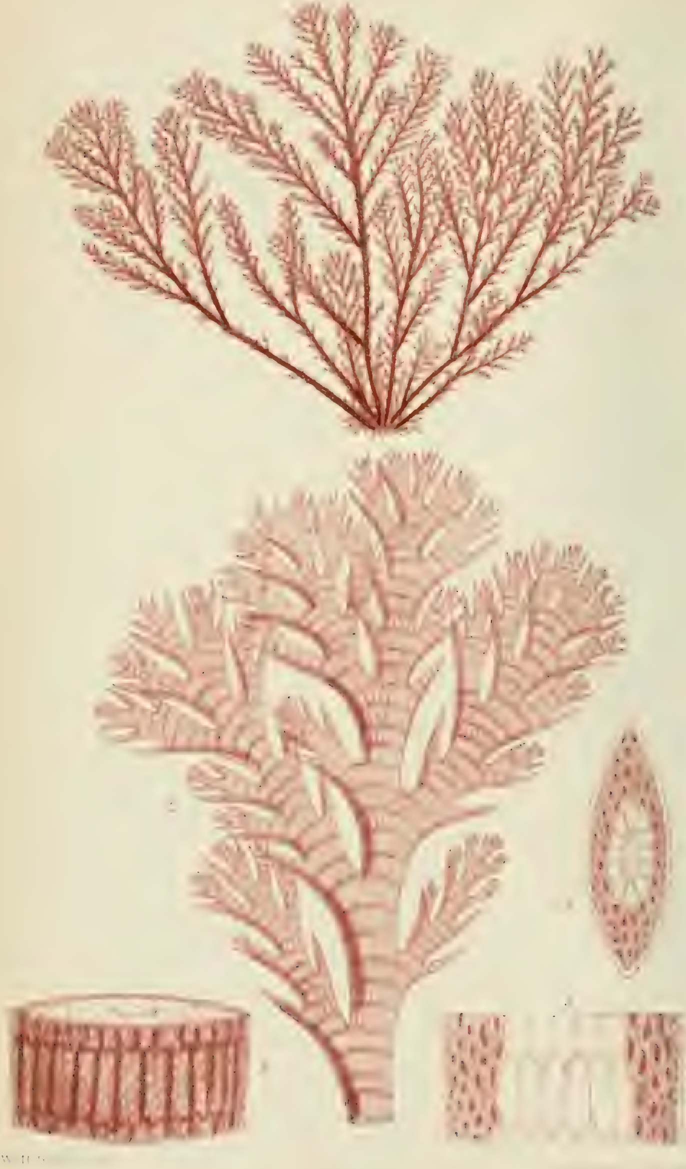
Plate CLXX.



W. H. [illegible]

PLATE CLXX.

RYTIPHLÆA COMPLANATA, *Ag.*

GEN. CHAR. *Frond* filiform or compressed, pinnate, transversely striate, reticulated; the axis articulated, composed of a circle of large, tubular, elongated cells (*siphons*), surrounding a central cell; the periphery of several rows of minute, irregular, coloured cellules. *Fructification* of two kinds, on distinct individuals; 1, ovate *capsules* (*ceramidia*) containing a tuft of pear-shaped spores; 2, *tetraspores*, contained in minute, lanceolate *receptacles* (*stichidia*), in a double row. RYTIPHLÆA (*Ag.*),—from ρυτις, a *wrinkle*, and φλοιος, the *bark*; because the surface is transversely wrinkled or striate.

RYTIPHLÆA *complanata*; frond brown-red, compressed, pinnate, or bi-tri-pinnate, the lower pinnæ short or abortive, the upper long, straight, erect, virgate, once or twice compounded; pinnulæ subulate, or bifid, erect, closely-set; the axils acute.

RYTIPHLÆA complanata, *Ag. Sp. Alg.* vol. ii. p. 54. *J. Ag. in Linn.* vol. xv. p. 26. *J. Ag. Alg. Medit.* p. 146. *Endl. 3rd Suppl.* p. 48. *Harv. Ner. Austr.* p. 32.

POLYSIPHONIA cristata, *Harv. in Mack. Fl. Hib.* part 3. p. 205. *Harv. Man.* p. 85.

FUCUS cristatus, var. γ. articulatus, *Turn. Hist.* t. 23. *f. h.*

PLOCAMIUM cristatum, *Lamour. Ess.* p. 50. t. 5. f. 1, 2, 3.

HAB. On the rocky beds of shallow tide-pools, exposed, at low-water, to full sunshine, among *Corallina officinalis*, &c. Perennial? Summer. Very rare. Bantry Bay, *Miss Hutchins.* Caarush Point, Miltown Malbay, abundant in one or two tide-pools, but very local, *W. H. H.* (1847). Whitsand Bay, *Dr. Jacob.* Dredged in Plymouth Sound, *Rev. W. S. Hore.*

GEOGR. DISTR. Atlantic coasts of France and Spain. Mediterranean Sea. South of England and Ireland. Cape of Good Hope.

DESCR. *Root*, a mass of branched, creeping, and clasping fibres. *Fronds* densely tufted, from two to four inches high, about half a line in breadth, plano-compressed, simple, or once forked below, flabellately branched, or more or less pinnate, or bi-tri-pinnate above. Lower portion of the stem either naked, or set with short subulate or pinnatifid ramuli; upper branches pinnate with branchlets, which increase in length and in *composition* upwards, the lowermost being simple, the upper pinnatifid, and the uppermost more compound still. All the divisions are strictly alternate and distichous, and the whole frond is marked with arching, transverse striæ, or dark lines, placed at distances of about half the diameter asunder: these indicate the joints of the internal axis, seen through the cells of the surface. *Ramuli* subulate, the older ones becoming bifid, and gradually multifid. I have seen no fruit on British specimens. *Substance* cartilaginous, not closely adhering to paper. *Colour* a dull brownish or somewhat purplish-red; becoming much darker in drying. Unless the specimens of this plant be allowed to remain some hours in fresh-water, they will stain the paper on which they may be laid, dull brown, and will themselves turn completely black and rigid, and refuse to adhere to the paper: by steeping, a large quantity of brown, offensive matter is discharged, and specimens so treated preserve a shade of red, and adhere to paper.

A very rare plant on the British shores, though frequent in the south of Europe. I believe it was first noticed by the late Miss Hutchins of Bantry, who communicated specimens to Mr. Turner, by whom they were regarded as an articulated variety of *Fucus cristatus*, the *Rhodymenia cristata* of modern writers. That so singular a mistake should have been committed by an author of so much judgment and knowledge of his subject as Mr. Turner, only shows the imperfect microscopic examination to which marine plants were at that time subjected. The resemblance between these species is merely an outward one; the structure is very different. In our modern system, therefore, instead of being regarded as varieties of one species, they are placed in widely separated genera.

The present plant has a structure very similar to that of a *Polysiphonia*, in which genus I formerly placed it. Indeed, except that we have here an external coating of cells, there is nothing to distinguish it from an ordinary *Polysiphonia*. It is very closely allied to *Pol. fruticulosa* and *P. thuyoides* of authors, and as these are of exactly similar structure, I propose to transfer them also to the genus *Rytiphlæa*, to which group ought to be added all completely inarticulate species of *Polysiphonia*.

Our figure is made from a specimen gathered at Miltown Malbay, where, in one or two stations, I was so fortunate as to meet with this beautiful plant in considerable abundance, last summer. It completely clothed the rocky bottom of a tide-pool, four or five yards in diameter, and from three to six inches in depth. Where the water became deeper the plant disappeared.

Fig. 1. RYTIPHLÆA COMPLANATA:—*of the natural size.* 2. Portion of a branch. 3. Portion of the surface. 4. Transverse section of the frond. 5. Longitudinal section of the same:—*all more or less magnified.*

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Plate CLXXI

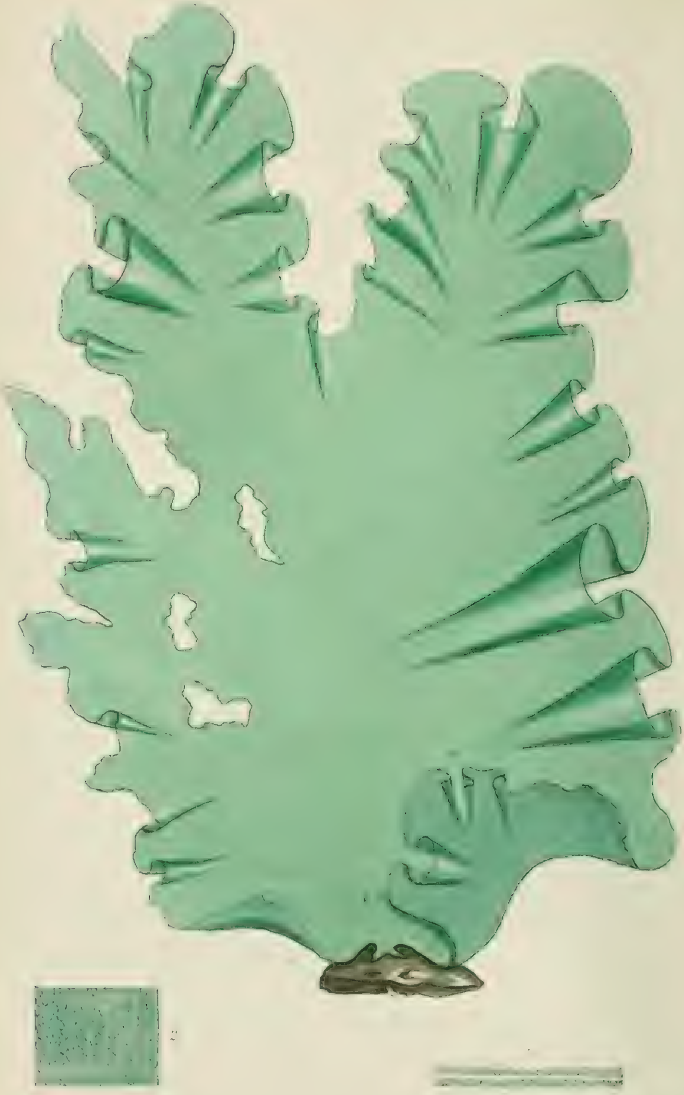

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PLATE CLXXI.

ULVA LATISSIMA, *Linn.*

GEN. CHAR. *Frond* membranaceous, green, expanded, plane, (in some cases saccate when young,) composed of irregular cells. *Fructification*; *granules,* often arranged in fours, scattered over the whole frond. ULVA,—supposed to be from *Ul, water,* in Celtic.

ULVA *latissima*; frond broadly-ovate or oblong, flat, of a full green colour.

ULVA latissima, *Linn. Fl. Suec.* p. 433. *Ag. Sp. Alg.* vol. i. p. 407. *Ag. Syst.* p. 188. *Grev. Alg. Brit.* p. 171. *Hook. Br. Fl.* vol. ii. p. 311. *Wyatt, Alg. Danm.* no. 33. *Harv. in Mack. Fl. Hib.* part 3. p. 242. *Harv. Man.* p. 170. *J. Ag. Alg. Medit.* p. 17. *Kütz. Phyc. Gen.* p. 296. *Mont. Fl. Alg.* p. 149. *Endl. 3rd Suppl.* p. 19.

ULVA lactuca, *Sm. E. Bot.* t. 1551. (*not of Linn.*)

ULVA lactuca, var. latissima, *Lightf. Fl. Scot.* p. 971.

HAB. On rocks and stones in the sea between tide marks; and extending to ten fathoms water, or perhaps a greater depth. Annual. Summer and autumn. Very common on the British shores.

GEOGR. DISTR. Throughout the ocean, nearly to the limits of vegetation in both hemispheres.

DESCR. *Root,* a small disc. *Fronds* from six to twenty inches in length or more, and from three to twelve in breadth, growing in tufts; very variable in shape, oblong, or ovate, with the margin more or less sinuated and wavy, variously plaited, glossy, translucent, of a very soft, but rather firmly membranous, though exceedingly thin, substance, and vivid green colour. In old age the fronds are frequently found pierced by holes, and infested with *Myrionemata*, and are then usually of a pale green colour. Sometimes, especially in specimens dredged from deep water, the colour is of a very dark, and even bluish green, reflecting glaucous tints when under water. In drying, this plant loses much of its brilliancy, and scarcely adheres to paper. *Structure* composed of two strata of exceedingly small, fully coloured cells of irregular shape, separated by an imperfectly coloured, thin, cellular layer.

An exceedingly common species, found on all shores, and nearly in all latitudes. Except on the extreme antarctic coasts, where all vegetation, save the *Diatomaceæ*, is at an end, *Ulva latissima* may be said to inhabit every shore. It is as abundant in the tropics as in the temperate zone. Nor do specimens from different countries exhibit many minor points of difference. Some are of more rigid texture than others, but there is little else peculiar about them. The form is too variable among specimens from the same locality to found any characters upon its gradations.

By older writers *Ulva latissima* was either entirely confounded with *U. lactuca*, or else was regarded as merely a variety of it. The distinctions are well pointed out by Dr. Greville, and are as visible in the young as in the full grown plant. *Ulva latissima* is, at all stages, a flat membrane, and in drying scarcely adheres to paper. *U. lactuca* is, at first, a closed sac, which soon bursts; it then exhibits a torn membranous frond, of a much more delicate substance than *U. latissima*, and of a paler colour; and in drying, it closely adheres to paper.

Lightfoot and succeeding authors tell us that *U. latissima*, under the name of *Oyster-green*, or *Green-Sloke*, is brought to table both in England and Scotland, used in the same manner as *Porphyra laciniata*, the true *Laver* or *Sloke*. I have never seen it so used. Lightfoot further says that "the Icelanders ascribe to it an anodyne virtue, and bind the leaves about the front and temples to assuage the head-ache in fevers, and to procure sleep; but the use of it in these intentions is supported by no good authority."—*Fl. Scot.* p. 971-2. If it have any effect in such cases, it probably arises from the cooling influence of the moisture retained in the leaves.

Fig. 1. ULVA LATISSIMA; a frond:—*of the natural size.* 2. Portion of the surface. 3. Section of the frond:—*highly magnified.*

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Plate CLXXII.

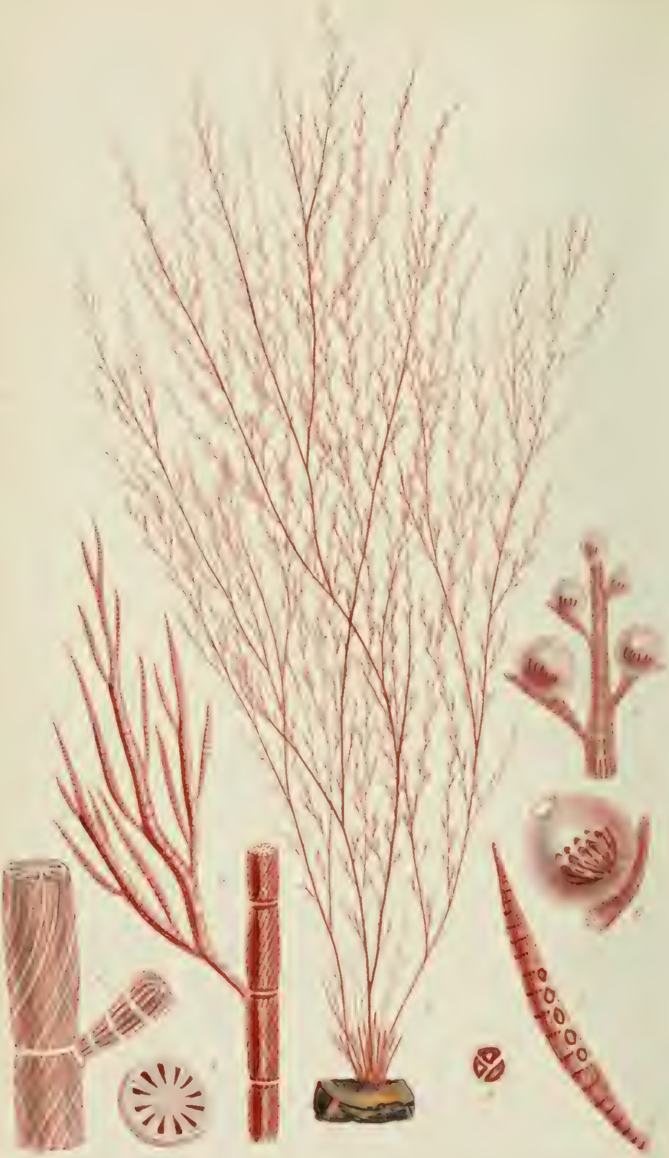

PLATE CLXXII.

POLYSIPHONIA ATRO-RUBESCENS, *Grev.*

GEN. CHAR. *Frond* filamentous, partially or generally articulate; joints longitudinally striate, composed of numerous radiating cells or tubes, disposed round a central cavity. *Fructification* two-fold, on different individuals; 1, ovate *capsules* (*ceramidia*), furnished with a terminal pore, and containing a tuft of pear-shaped spores; 2, *tetraspores*, imbedded in swollen branchlets. POLYSIPHONIA (*Grev.*),—πολυς, *many*, and σιφων, a *tube*.

POLYSIPHONIA *atro-rubescens*; filaments setaceous, sparingly or much branched, dark brownish-red, somewhat rigid; branches long, alternate, very erect, mostly undivided, usually furnished with a second (or third) set of lesser branches, naked, or clothed with short, simple or multifid, scattered, subulate ramuli, which taper to the base and apex; articulations variable, the lower twice or thrice as long as broad, the upper gradually shorter, marked with several, spirally curved tubes; siphons about twelve; capsules broadly ovate or subrotund, sessile, nearly or quite terminal; tetraspores imbedded in multifid ramuli.

POLYSIPHONIA atro-rubescens, *Grev. Fl. Edin.* p. 308. *Hook. Br. Fl.* vol. ii. p. 331. *Harv. in Mack. Fl. Hib.* part 3. *Harv. Man.* p. 87. *Harv. Ner. Aust.* p. 53. *Kütz. Phyc. Gen.* p. 424. *Endl. 3rd Suppl.* p. 45.

POLYSIPHONIA Agardhiana, *Grev. Scot. Crypt. Fl.* t. 210. *Harv. in Hook. Br. Fl.* vol. ii. p. 331. *Wyatt, Alg. Danm.* no. 134. *Kütz. Phyc. Gen.* p. 420. *Endl.* p. 45.

POLYSIPHONIA badia, *Grev. Hook. Br. Fl.* vol. ii. p. 331.

POLYSIPHONIA denudata, *Grev. Hook. Br. Fl.* vol. ii. p. 382. *Endl. 3rd Suppl.* p. 45.

HUTCHINSIA atro-rubescens, *Lyngb. Hyd. Dan.* p. 110. *Ag. Sp. Alg.* vol. ii. p. 64.

HUTCHINSIA Agardhiana, *Ag. Sp. Alg.* vol. ii. p. 66.

HUTCHINSIA badia, *Ag. Syn.* p. 56. *Lyngb. Hyd. Dan.* p. 114. *Ag. Syst.* p. 155. *Ag. Sp. Alg.* vol. ii. p. 74.

HUTCHINSIA denudata, *Ag. Sp. Alg.* vol. ii. p. 73.

CONFERVA nigra, *Huds. Fl. Ang.* p. 595. *Dillw. Syn.* no. 162. *E. Bot.* t. 2340.

CONFERVA atro-rubescens, *Dillw.* t. 70.

CONFERVA badia, *Dillw. Syn.* no. 161. t. G.

CONFERVA denudata, *Dillw. Syn.* no. 160. t. G.

HAB. On rocks and stones in the sea, near low-water mark. Annual. Summer and autumn. Not uncommon.

GEOGR. DISTR. Atlantic coasts of Europe and North America. Falkland Islands, *Dr. Hooker*. Cape of Good Hope, *W. H. H.*

DESCR. *Root* scutate. *Fronds* densely tufted, from three to twelve inches in length, as thick as hogs' bristle, gradually tapering to a capillary fineness, much or little branched; the main divisions once or twice forked, the rest of the branches alternate, very erect and mostly divided, long, and virgate, either naked, or more or less furnished with lateral secondary branches, which in luxuriant specimens bear a third series; all the branches set, at variable distances, with short, spine-like, very erect or appressed ramuli, 1–2 lines in length, which are at first simple, but finally become multifid, having, to the eye, a pencillate or tufted character. All the apices very much attenuated, when young, fibrilliferous. *Articulations* marked with numerous spiral tubes, the lower ones 2–3 times, the upper once and half as long as broad, the ultimate shorter than their breadth. *Siphons* twelve. *Capsules* very broad, with a wide mouth. *Tetraspores* small, always found in plants whose ramuli are most multifid or tufted. *Colour* a dark, full-red, becoming brownish, or even black in drying. Substance somewhat rigid, more or less firmly adhering to paper in drying.

So long a string of synonyms seems to speak of a plant of very variable aspect. Yet the species here figured is tolerably constant to its characters, and much less variable than some others of the genus, about which botanists have had fewer differences. This plant has appeared under *four* names in the works of most authors; the first, *P. badia*, refers to the frond in a half-grown state; *P. atro-rubescens*, to the ordinary form of the full-grown plant; *P. Agardhiana*, to a luxuriant state of the frond, coupled with an imperfect state of capsular fruit; and *P. denudata*, to a battered and denuded state of the frond.

This species, under the name *Conferva nigra*, was first published by Hudson, whose character is sufficiently descriptive, and whose synonym is authenticated by specimens existing in the Herbaria of the late Sir T. Frankland and the Rev. H. Davies. It was afterwards figured by Dillwyn, as a new species, under the name *atro-rubescens*; a name subsequently given up by that author, on discovering the identity of his plant with the *nigra* of Hudson. Subsequent writers have, without exception, adopted *atro-rubescens* as the more descriptive of the two names, though not the most ancient.

Fig. 1. POLYSIPHONIA ATRO-RUBESCENS:—*of the natural size.* 2. Part of a branch, bearing a multifid ramulus. 3. Joints from the same. 4. Cross section. 5. Apex of a fertile stem, bearing capsules. 6. A ramulus, with its capsule. 7. A ramulus with tetraspores. 8. A tetraspore.

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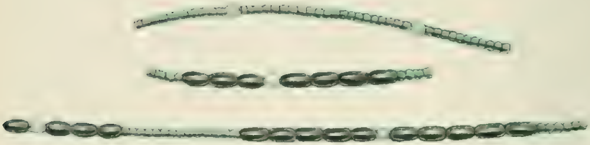
Plate CLXXIII.

A.



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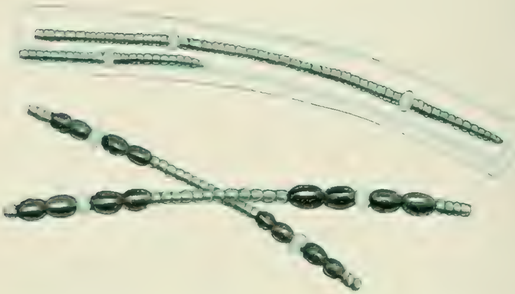

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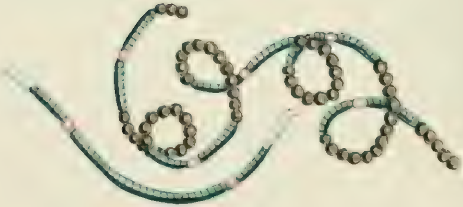

PLATE CLXXIII. *A.*

SPHÆROZYGA BROOMEI, *Thw. MSS.*

GEN. CHAR. *Filaments* free, simple, moniliform, consisting of a series of ordinary cells, interrupted here and there by a cell of a different kind (*connecting cell* or *heterocyst*). *Spores* formed from the ordinary cells. SPHÆROZYGA (*Ag.*),—from σφαιρα, a *sphere*, and ζυγος, a *yoke*.

SPHÆROZYGA *Broomei*; "spores numerous, elliptical, twice as long as wide, not much exceeding in width the ordinary cells, commencing to be formed from the cells nearest the connecting cells: connecting cells smooth, subquadrate, rather longer than wide."—*Thw. MSS.*

HAB. On dead leaves of *Myriophyllum*, &c., in a brackish ditch at Shirehampton, near Bristol. June. *Mr. G. E. Broome*; *Mr. G. H. K. Thwaites.*

"A very distinct species, first detected by G. E. Broome, Esq., an excellent Cryptogamic botanist, after whom it is named."—*Thwaites.*

Fig. *A.* Filaments of SPHÆROZYGA BROOMEI:—*magnified* 250 *linear.*

PLATE CLXXIII. *B.*

SPHÆROZYGA BERKELEYANA, *Thw. MSS.*

SPHÆROZYGA *Berkeleyana*; "Spores large, twice the width of the ordinary cells, oblong, half as long again as wide, becoming brown when mature, generally two on each side the connecting cell, which is sphæroidal, slightly compressed. Young filaments included, one or several together, in a defined, mucous sheath."—*Thw. MSS.*

HAB. Scattered amongst the filaments of *Conferva fracta*, &c., in a brackish ditch at Shirehampton, near Bristol. June. *Mr. G. H. K. Thwaites.*

"This fine species, which is named in honour of Rev. M. J. Berkeley, is interesting from the circumstance of its filaments, when young, being enclosed, often several together, in definite, gelatinous sheaths, out of which they appear to escape before the spores are mature. There are other species, occurring in fresh water, which exhibit the same peculiarity of structure, but it does not seem to have hitherto been noticed."—*Thw. MS.*

Fig. 1. SPHÆROZYGA BERKELEYANA; filaments:—*magnified* 250 *linear.*

PLATE CLXXIII. *C.*

SPERMOSIRA HARVEYANA, *Thw. MS.*

GEN. CHAR. "Same as that of *Sphærozyga,* except that each filament is enclosed in a very delicate, membranous sheath."—*Thw.*

SPERMOSIRA *Harveyana*; "filaments much curved, composed of cells nearly as long as broad: spores exactly spherical, almost twice the diameter of the cells: connecting cells subquadrate, rather longer than wide, and of the same width as the ordinary cells."—*Thw.*

HAB. Occurring intermixed with *Sphærozyga Broomei,* at Shirehampton, near Bristol. June, 1847. *Mr. G. H. K. Thwaites.*

"This beautiful species differs from the *Spermosira litorea,* Kütz., figured in [our] Plate CXIII., in its spores being not at all compressed, and its ordinary cells much longer compared with their width. The membranous sheath investing the filament is with difficulty seen, and the plant bears considerable resemblance to some species of *Sphærozyga.* The curved filaments and spherical spores render it not very unlike *Monormia intricata,* Berk., from which it is, however, perfectly distinct"—*Thw. MS.*[*]

Fig. 1. *C.* SPERMOSIRA HARVEYANA:—*magnified* 250 *linear.*

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[*] I am indebted to my friend G. H. K. Thwaites, Esq., of Bristol, for the drawings copied in Plate CLXXIII., and the accompanying descriptive characters. I have also to return him my thanks for the honour he has done me in naming the *Spermosira*; but especially for the hearty expressions which accompanied the "*patent.*" Writing to congratulate me on a recent appointment, after the kindest expressions, he concludes by saying, "Do let me, in honour of the occasion, call the beautiful new *Spermosira,* of which I have just sent you a sketch, *S. Harveyana,* and thus pay the first tribute of respect, of this kind, to you in your new capacity."

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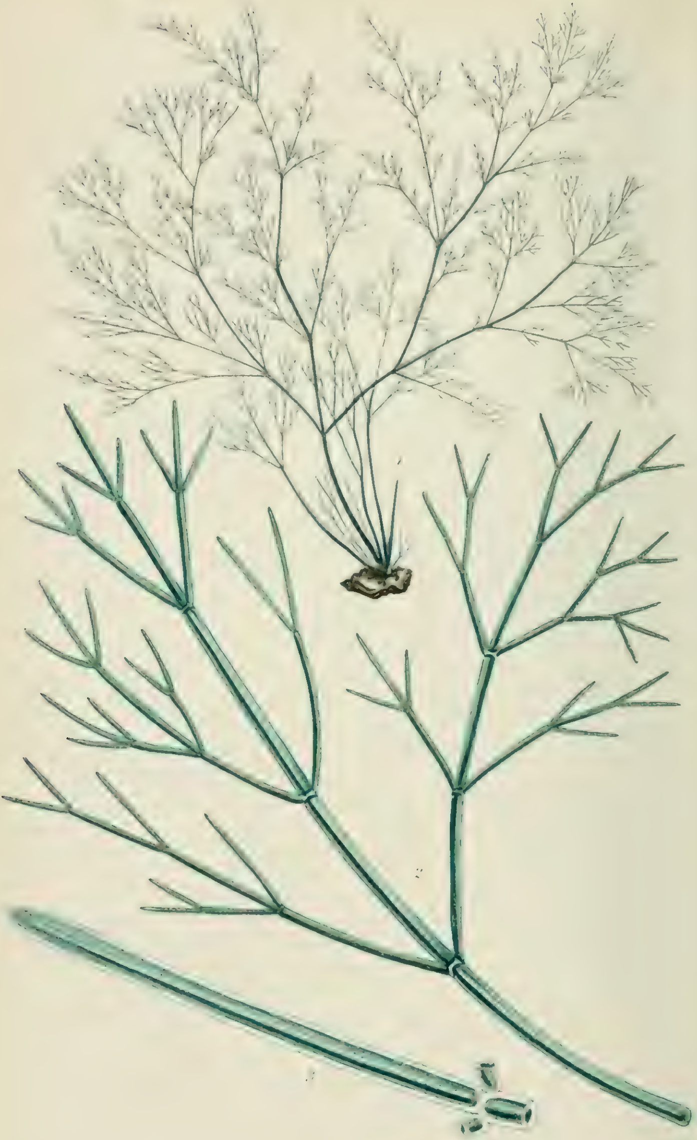

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PLATE CLXXIV.

CLADOPHORA PELLUCIDA, *Kütz.*

GEN. CHAR. *Filaments* green, jointed, attached, uniform, branched. *Fruit,* aggregated granules or zoospores, contained in the articulations, having, at some period, a proper ciliary motion. CLADOPHORA (*Kütz.*), —from κλαδος, a *branch,* and φορεω, to *bear.*

CLADOPHORA *pellucida*; filaments rigid, erect, setaceous, full dark-green, di-tri-chotomous; the axils very acute, the branches erect; articulations many times longer than broad; dissepiments only at the forking of the branches and ramuli.

CLADOPHORA pellucida, *Kütz. Phyc. Gen.* p. 271.

CONFERVA pellucida, *Huds. Fl. Ang.* p. 601. *Dillw. Conf.* t. 90. *E. Bot.* t. 1716. *Ag. Syst.* p. 120. *Harv. in Hook. Br. Fl.* vol. ii. p. 357. *Harv. in Mack. Fl. Hib.* part 3. p. 228. *Wyatt, Alg. Danm.* no. 193. *J. Ag. Alg. Medit.* p. 13. *Harv. Man.* p. 135.

HAB. On the bottoms and sides of deep rock-pools, between tide marks, generally near low-water mark; not left dry at low water. Annual? Summer. Not uncommon on the shores of England and Ireland.

GEOGR. DISTR. Atlantic shores of Europe and America. Mediterranean Sea. Cape of Good Hope, *W. H. H.*

DESCR. *Root* scutate, firmly attached to the rock. *Filaments* from three to six or eight inches high, thicker than hogs' bristle, tufted, or subsolitary, extremely rigid, almost wiry, tough and strong, rising with an undivided stem to the height of an inch or more, then either forked or trifurcate, and afterwards repeatedly branched, at short intervals, in a dichotomous or trichotomous manner, some specimens being nearly constantly trichotomous, others dichotomous, and others exhibiting a combination of these methods of branching. Besides this regular ramification, old and luxuriant specimens frequently emit from the forkings, or axils, accessory ramuli more slender than the cells they spring from, but branching in the same manner. Occasionally these are very numerous and densely tufted. *Articulations* one to each *internode* of the branches, many times longer than broad, cylindrical, filled with dense fluid matter, which is usually dissipated in drying, when the plant fades to a pale green, preserving a somewhat glazed lustre, like that of *Bryopsis.* In drying it adheres very imperfectly to paper.

It is pleasant in such a genus as *Cladophora,* where the species often seem to run insensibly into one another, to find one so broadly distinguished from the rest that there can be no mistake about it. The plant here figured is just of this character. *Cladophora pellucida* may at once be known by its very distinct

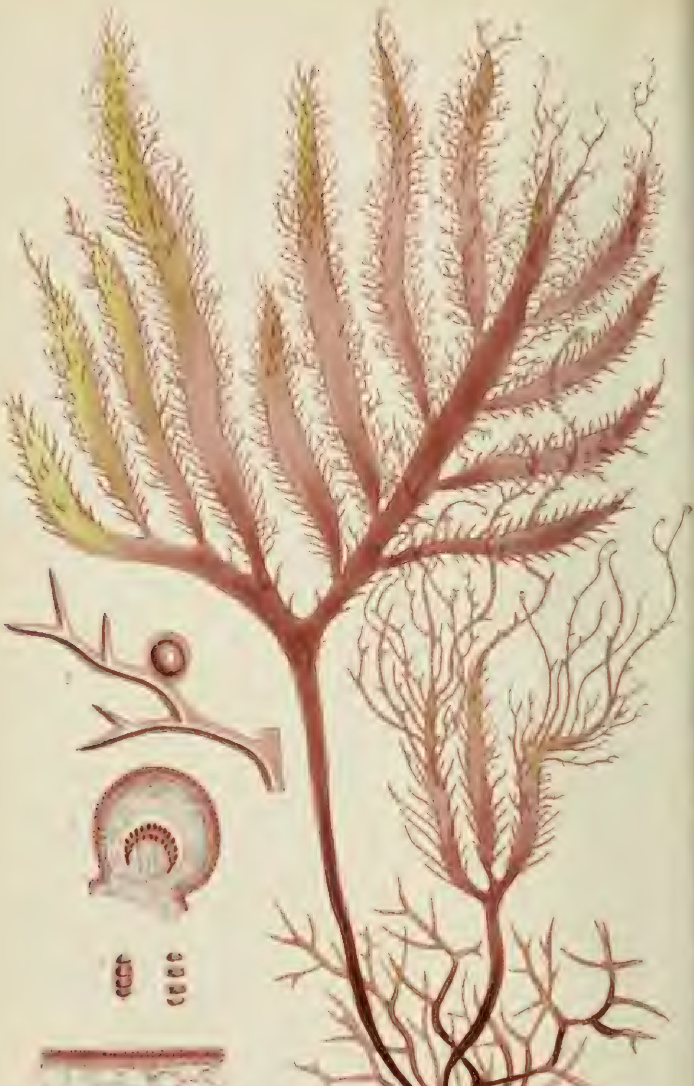

PLATE CLXXV.

RHODYMENIA JUBATA, *Grev.*

GEN. CHAR. *Frond* flat, membranaceous or subcoriaceous, ribless, veinless, cellular; central cells of small size; those of the surface minute. *Fructification* of two kinds, on distinct individuals; 1, convex *tubercles* (*coccidia*) having a thick, cellular pericarp, containing a mass of minute spores on a central placenta. 2, *tetraspores,* either zoned or triparted, imbedded among the cells of the surface, scattered, or forming cloudy patches. RHODYMENIA (*Grev.*),—from ροδεος, *red,* and υμην, a *membrane.*

RHODYMENIA *jubata*; frond thickish, flaccid, subcartilaginous, dull-red, linear-lanceolate, much attenuated or cirrhose at the apex, vaguely pinnate with laciniæ of the same form; the margins, and often the disk, beset with subulate or filiform cilia, in which both tubercles and tetraspores are produced on distinct plants; root fibrous, branching.

RHODYMENIA jubata, *Grev. Alg. Brit.* p. 91. *Hook. Br. Fl.* vol. ii. p. 291. *Wyatt, Alg. Danm.* no. 18. *Harv. in Mack. Fl. Hib.* part 3, p. 194. *Harv. Man.* p. 63. *J. Ag. Alg. Medit.* p. 153. *Endl. 3rd Suppl.* p. 51.

CALLIBLEPHARIS jubata, *Kg. Phyc. Gen.* p. 404.

SPHÆROCOCCUS jubatus, *Grev. Scot. Crypt.* t. 359.

SPHÆROCOCCUS ciliatus, vars. jubatus, linearis, angustus, and spinosus, *Ag. Sp. Alg.* vol. i. p. 264. *Ag. Syst.* p. 221.

FUCUS jubatus, *Good. and Wood. Lin. Trans.* vol. iii. p. 162. t. 17. *Stack. Ner. Brit.* p. 51. t. 11.

FUCUS ciliatus, vars. jubatus, lanceolatus, angustus, and spinosus, *Turn. Hist.* t. 70. fig. *f–h.*

HAB. On the bottoms of rock-pools between tide marks, chiefly near low-water mark; also among the roots of *Laminaria digitata.* Annual. Fruiting in summer. Frequent on the shores of the British islands from Orkney to Cornwall, and Jersey.

GEOGR. DISTR. Atlantic shores of Europe. Mediterranean Sea.

DESCR. *Root* composed of densely matted, branching fibres. *Fronds* densely tufted, very variable in form. They all rise with a cylindrical stem which is from one to five or six inches in length, becoming gradually wider and more compressed upwards and expanding into a flat, linear-lanceolate, very narrow, simple or forked frond, which is much drawn out at the apex, and more or less regularly pinnate with laciniæ resembling itself. These *pinnæ* are often secund; and often very irregularly placed. Their margins and disk are more or less densely clothed with filiform cilia from 1–2 lines to an inch or more in length, branching or simple; in some varieties produced into cirrhi 3–6 inches long or more, which clasp round each other and round neighbouring Algæ in a very entangled manner. Sometimes the whole frond is cylindrical, much and irregularly branched; the branches spreading and set with spine-like ramuli. *Tubercles* spherical, sessile on the sides of the cilia. *Tetraspores* contained in the cilia, oblong, transversely zoned. *Substance* cartilaginous, but flaccid, soon altering in fresh water. *Colour* a dull red, which quickly becomes orange in fresh water, and changes to brownish in drying; in which state the plant, if placed under pressure, adheres to paper, but shrinks considerably.

This species, first distinguished by Micheli, received the specific name which it now bears from Messrs. Goodenough and Woodward, who described it in their memoir on the species of *Fucus* in the Linnæan Transactions. Mr. Turner in his Synopsis, and subsequently in his great work, regards it as merely a variety of *R. ciliata*, to which species, no doubt, it is very closely allied. Mrs. Griffiths, however, clearly points out characters by which they may be distinguished, namely, the more flaccid substance and duller colour of *R. jubata*, and the different position of the *tetraspores*, these being in the present species confined to the cilia, and in *R. ciliata* immersed in the laciniæ of the frond. To this may be added that *R. ciliata* is a winter plant, and *R. jubata* in perfection in summer.

The *tubercles* of this species are rare. I have only gathered them in a locality at Miltown Malbay (in rock-pools opposite "Billowville"), but in that station I found them abundantly, first in 1831, afterwards in 1847. The plant is common on most of the British shores, but scarcely ever found with *tubercles*.

Few plants are more sportive in appearance. Our plate represents some of the more common forms: but specimens are often found in which the cilia are much more copiously developed, or where the whole frond is exceedingly slender, filiform, and entangled. Such examples may at first sight be mistaken for luxuriant tufts of *Gigartina acicularis*.

Fig. 1. Rhodymenia jubata; fronds:—*of the natural size*. 2. A cilium, with tubercle. 3. Vertical section of a tubercle. 4. Tetraspores. 5. Section of the frond:—*all more or less magnified*.

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PLATE CLXXVI.

LEATHESIA BERKELEYI, *Harv.*

GEN. CHAR. *Frond* globose or lobed, fleshy, composed of jointed, colourless, dichotomous filaments, issuing from a central point; their apices, which constitute a fleshy coating to the frond, coloured and tufted. *Fructification*; oval *spores*, attached to the coloured tips of the filaments. LEATHESIA (*Gray*),—in honour of the Rev. Mr. Leathes, a British naturalist.

LEATHESIA *Berkeleyi*: fronds dark brown, depressed, fleshy, solid; filaments densely packed.

CHÆTOPHORA Berkeleyi, *Grev. in Berk. Gl. Alg.* t. 1. fig. 2. *Harv. in Hook. Br. Fl.* vol. ii. p. 390. *Wyatt, Alg. Danm.* no. 231. *Harv. Man.* p. 123.

HAB. On submarine rocks, between tide marks; exposed at low water. Annual. Summer. Torquay, *Rev. M. J. Berkeley.* Tor Abbey rocks, *Mrs. Wyatt.* Rocks at Kilkee, Co. Clare (1833); Miltown Malbay; and Valentia, Kerry, *W. H. H.*

GEOGR. DISTR. South of England and West of Ireland.

DESCR. *Fronds* gregarious, one or two inches in diameter, from a quarter to half an inch in thickness, convex, but depressed, irregular in form, dark brown, fleshy, soft, somewhat elastic, not gelatinous to the touch, *solid* at all periods of its growth. *Filaments* very densely packed, dichotomous, composed of three kinds of cells; the cells of the lower part cylindrical or slightly pyriform, several times longer than their diameter; those of the middle portion bead-like, oval, partially coloured; those of the terminal branchlets, which are irregularly branched and densely compacted together, very short and full of dark-olive endochrome. *Fruit* unknown. In drying, the plant shrinks considerably, and partially adheres to paper.

A small plant, more curious than beautiful, first noticed by the Rev. M. J. Berkeley on rocks at Torquay, from which locality I have received specimens gathered by Mrs. Griffiths and Mrs. Wyatt. On the west coast of Ireland it is plentiful in several places and probably is pretty generally distributed along our shores, being overlooked on account of its being often nearly of the colour of the rock on which it grows, and resembling, in its fleshy appearance and feel, the collapsed body of the common *Actinia.* The Irish specimens (from which, in a living state, our figure is taken) appear to be identical with those published by Mrs. Wyatt, and agree very well with the description of the

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plant given by Mr. Berkeley, so far as outward resemblance may be trusted. But the magnified figure of that author is very unlike that now given; nor have I been able to detect the long diaphanous points to the filaments which he describes. Still I am inclined to regard our plants as identical.

From the common *Leathesia tuberiformis* (*Corynephora marina*, Ag. and Brit. Fl.), *L. Berkeleyi* differs in being at all times of a dense and solid substance (not, as *L. tuberiformis*, at first flocculent within, and then hollow), in its different colour, and more depressed form. In all the essential characters, if my analysis, made from the recent plant, may be depended on, the two plants agree in structure. I therefore remove *L. Berkeleyi*, which was at first placed in *Chætophora*, to the present genus. The name *Corynephora* under which these plants have been hitherto known to British botanists must be laid aside, being too like, both in sound and sense, to *Corynephorus*, Palis., a genus of Grasses; and that now revived was proposed for the typical species in 1821, three years earlier than Agardh applied *Corynephora* to it.

Fig. LEATHESIA BERKELEYI; cluster of fronds:—*of the natural size.* 2. Vertical section of a frond:—*moderately magnified.* 3. Some of the filaments of which it is composed:—*highly magnified.*

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Plate CLXXVII

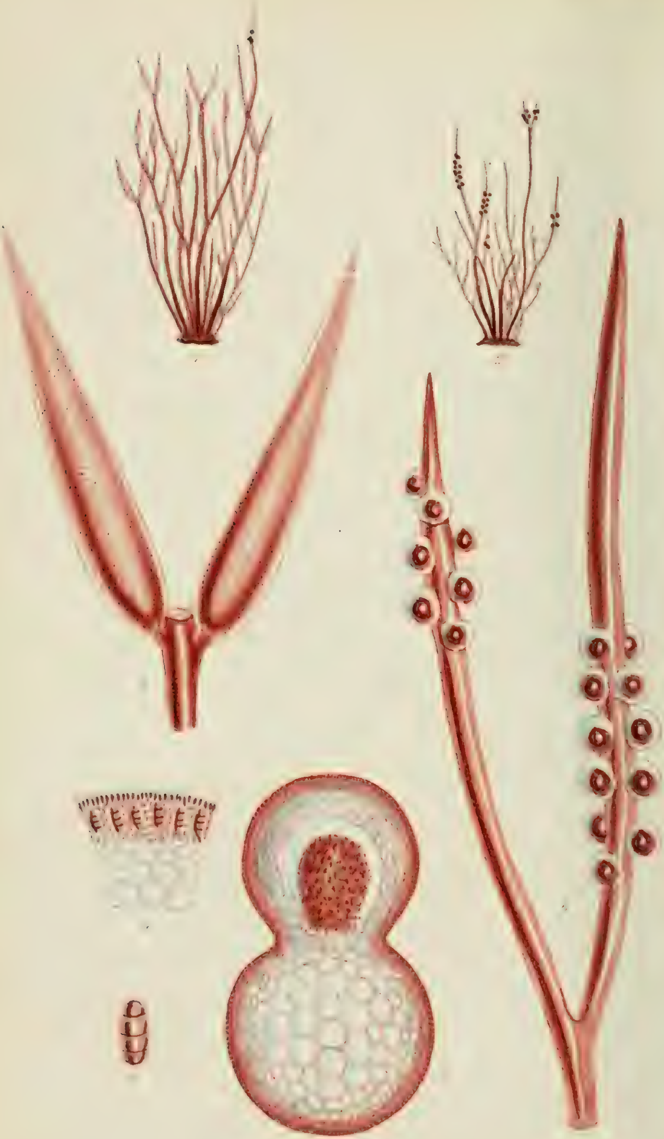

PLATE CLXXVII.

GRACILARIA ERECTA, *Grev.*

GEN. CHAR. *Frond* filiform, or rarely flat, carnoso-cartilaginous, continuous, cellular; the central cells very large, empty or full of granular matter; those of the surface minute, forming densely packed, vertical filaments. *Fructification* of two kinds on distinct individuals; 1, convex *tubercles* (*coccidia*) having a thick pericarp composed of radiating filaments, containing a mass of minute spores on a central placenta; 2, *tetraspores* imbedded in the cells of the surface.

GRACILARIA *erecta*; fronds numerous from a common disk, short, erect, cylindrical, sparingly dichotomous; branches subsimple; tubercles globose, clustered; tetraspores contained in terminal, lanceolate, pod-like ramuli.

GRACILARIA erecta, *Grev. Alg. Brit.* p. 124. t. 14.

PLOCARIA erecta, *Endl. 3rd Suppl.* p. 51.

GIGARTINA erecta, *Hook. Br. Fl.* vol. ii. p. 300. *Wyatt, Alg. Danm.* no. 115. *Harv. Man.* p. 357. *Harv. in Mack. Fl. Hib.* part 3. p. 200.

SPHÆROCOCCUS (?) erectus, *Grev. Crypt.* t. 357.

HAB. On sand-covered rocks near low-water mark; also in 4–5 fathom water. Perennial. Fruiting in winter. Very rare. Sidmouth and Torquay, *Mrs. Griffiths.* Belfast Bay, *Mr. W. Thompson.* Port Ballantrae, *Mr. D. Moore.* Roundstone, *Mr. Mc Calla.* Orkney, *Rev. J. H. Pollexfen, Lieut. Thomas, and Dr. Mc Bain.*

GEOGR. DISTR. Coast of France.

DESCR. *Root* a flat, thin disk, spreading on the rock. *Fronds* numerous from the same base, from two to four inches high, seldom so much, cylindrical, filiform, erect, twice as thick as hog's bristle, irregularly branched; sometimes simple for their greater length, forked at the apex; sometimes twice or thrice forked; sometimes furnished with a few lateral branches. *Branches* mostly simple, long, naked, often flexuous, tapering to a fine point. *Tubercles* sphærical, very prominent, densely clustered on the branches, often near the tips, containing, under a thick, cellular coating, a large central mass of minute spores. *Tetraspores* contained in lanceolate, terminal *pods* or swollen ramuli, which are mostly in pairs; oblong, transversely parted. *Colour* a more or less deep red, becoming darker in drying. *Substance* cartilaginous, somewhat rigid. It does not adhere, or but very imperfectly, to paper in drying.

A curious and elegant little plant, scarcely known out of England, and one of the discoveries of Mrs. Griffiths, to whom it has long been familiar under the manuscript name *suffocatus*;

a name designed to express a peculiarity of growth, its favourite habitat being the flat bottoms of shallow rock-pools, where it is generally half buried in sand. Dr. Greville, who first described and figured it in his Cryptogamic Flora, gave it the name *erectus*, from another of its distinguishing characters, the peculiarly upright and rigid frond. When in perfect fructification it is easily recognised; the clustered tubercles and the lanceolate pod-like tips being both very striking characteristics. But barren specimens are exceedingly like, except in colour, young plants of *G. confervoides*, from which their greater simplicity, and more rigid substance, and erect growth, alone distinguish them. It is proper to mention that the Orkney specimens above noticed are without fruit; and, therefore, notwithstanding the perfect resemblance of their frond to Devonshire individuals, some doubt may rest upon their identity. In my own judgement they *do* belong to this species; but I am informed that another very competent authority is not satisfied; nor until fertile plants shall have been procured is it possible to determine which opinion is correct. The French specimen, communicated by M. Lenormand, is also barren, and is therefore equally doubtful.

Fig. 1. GRACILARIA ERECTA, with *pods*. 2. With *tubercles*:—*both of the natural size*. 3. Pods. 4. Transverse section of the surface of a pod, showing imbedded tetraspores. 5. A tetraspore. 6. Branches with tubercles. 7. Transverse section of a branch and a tubercle:—*all more or less magnified*.

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Plate CLXXVIII.

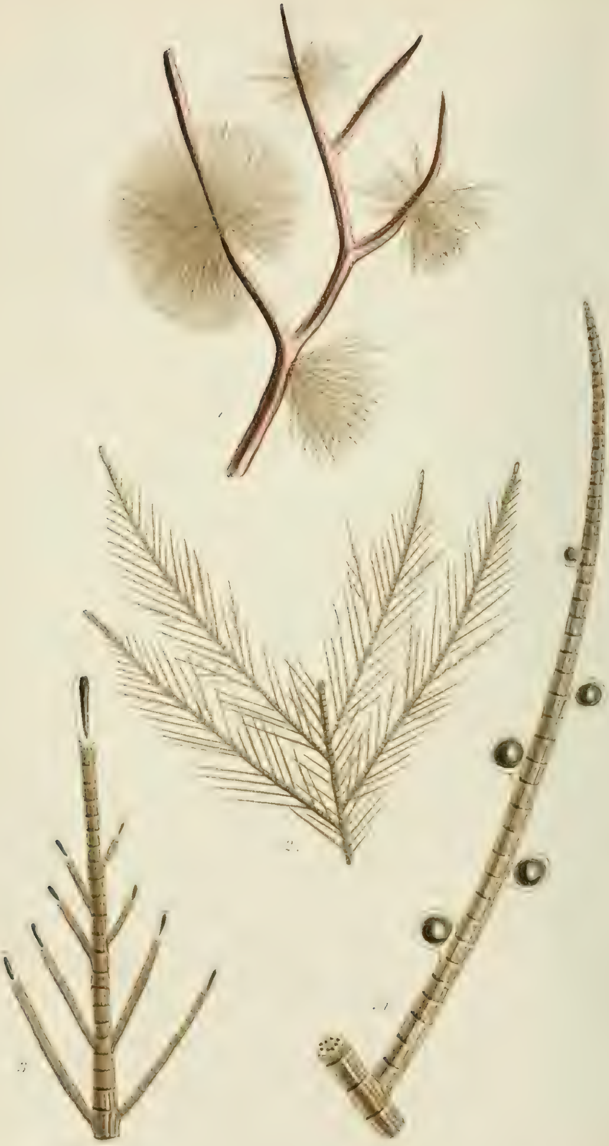

PLATE CLXXVIII.

SPHACELARIA CIRRHOSA, *Ag.*

GEN. CHAR. *Filaments* jointed, rigid, distichously branched, pinnated; rarely simple or subdichotomous. *Apices* of the branches distended, membranous, containing a dark, granular mass. *Fructification*; elliptical *utricles* (or *spores*), borne on the ramuli. SPHACELARIA (*Lyngb.*), from σφακελος, *gangrene,* alluding to the withered tips of the branches.

SPHACELARIA *cirrhosa*; parasitical; filaments naked at the base, short, densely tufted, simple or branched, jointed throughout; stem, or branches, pinnate; pinnæ opposite, alternate, or irregular, of unequal length; utricles sessile or shortly stalked, scattered, globose.

SPHACELARIA cirrhosa, *Ag. Syst. Alg.* p. 164. *Ag. Sp.* vol. ii. p. 27. *Harv. in Hook. Br. Fl.* vol. ii. p. 324. *Wyatt, Alg. Danm.* no. 171. *Harv. in Mack. Fl. Hib.* part 3. p. 180. *Harv. Man.* p. 38. *J. Ag. Alg. Medit.* p. 29. *Endl. 3rd Suppl.* p. 24. *Grev. Crypt.* t. 317. *Kg. Phyc. Gen.* p. 292.

SPHACELARIA pennata, *Lyngb.* p. 105. t. 31. (excl. var. β.)

CERAMIUM cirrhosum, *Hook. Fl. Scot.* part 2. p. 86.

CONFERVA marina perbrevis villosa et cirrhosa, *Dill. Musc.* t. 4. f. 21.

CONFERVA cirrhosa, *Roth. Cat.* vol. ii. p. 214. vol. iii. p. 294.

CONFERVA intertexta, *Roth. Cat.* vol. i. p. 188. t. 3. f. 5.

CONFERVA pennata, *Huds.* p. 604. *Dillw.* t. 86. *E. Bot.* t. 2330 (*right-hand figure*). *Fl. Dan.* t. 1486. f. 2.

HAB. Parasitic on the smaller Algæ, between tide marks. Perennial? Summer. Very common.

GEOGR. DISTR. Abundant on the Atlantic and Mediterranean shores of Europe.

DESCR. *Filaments* from a quarter of an inch to one or two inches in length, slender, forming globose, dense tufts, very variable in the amount of ramification. Some of the smaller varieties are but slightly branched, the branches irregularly pinnate. In others the main filament is repeatedly divided, the branches closely set, spreading, short in the lower part of the frond, elongated above, once or twice pinnate. *Pinnæ* closely set, opposite or alternate, erect or spreading, mostly simple and naked, sometimes pinnulated, very irregular in length, but gradually becoming shorter to the tips, slightly tapering. *Apices* frequently sphacelate. *Joints* visible in all parts of the stem and branches, at distances asunder equal to about the diameter of the frond, longitudinally striate. *Utricles* globose, scattered along the pinnæ, either sessile or raised on short stalks. *Colour* olive; becoming a foxy brown in age. *Substance* rigid, not adhering to paper in drying.

Here we have a very common and very variable plant, which puts on several distinct looking forms, according to the locality in which it may grow; but, on a careful examination of numerous specimens of these varieties now before me, I cannot fix on any characters which appear of specific value. My friend Mr. Hore finds that the utricles or spores of the small variety which commonly grows on *Desmarestia aculeata* are borne on little stalks, while in the common form represented in our plate they are mostly sessile; and this character, were it constant, would afford a readily appreciable mark of distinction. But when making the sketch for the magnified ramulus (fig. 4) taken, without selection, from a specimen of the common form, I observed that though the spores are often nearly sessile, there is frequently a short pedicel. And when any disposition to form a pedicel exists in so variable a plant as this, its amount must be most uncertain. The spore is to be regarded morphologically as an abbreviated ramulus; where the *whole* ramulus is converted into a spore, that organ will be sessile; but when a part only is so changed, it will be stalked.

This species was once confounded with *S. plumosa,* but differs from that beautiful plant in habit and size, in its jointed main filaments, and in being far less regularly pectinato-pinnated, with proportionally shorter pinnules. Being a very common plant, it was among the first of the genus observed by botanists, and is figured in the Historia Muscorum of Dillenius, under the specific name here preserved. By Hudson it was subsequently called *pennata,* a name adopted by succeeding authors until the older one was restored by Roth.

Fig. 1. Sphacelaria cirrhosa; tufts:—*of the natural size.* 2. Part of the stem and pinnated branches. 3. Apex of a branch with ramuli. 4. Ramulus with utricles.

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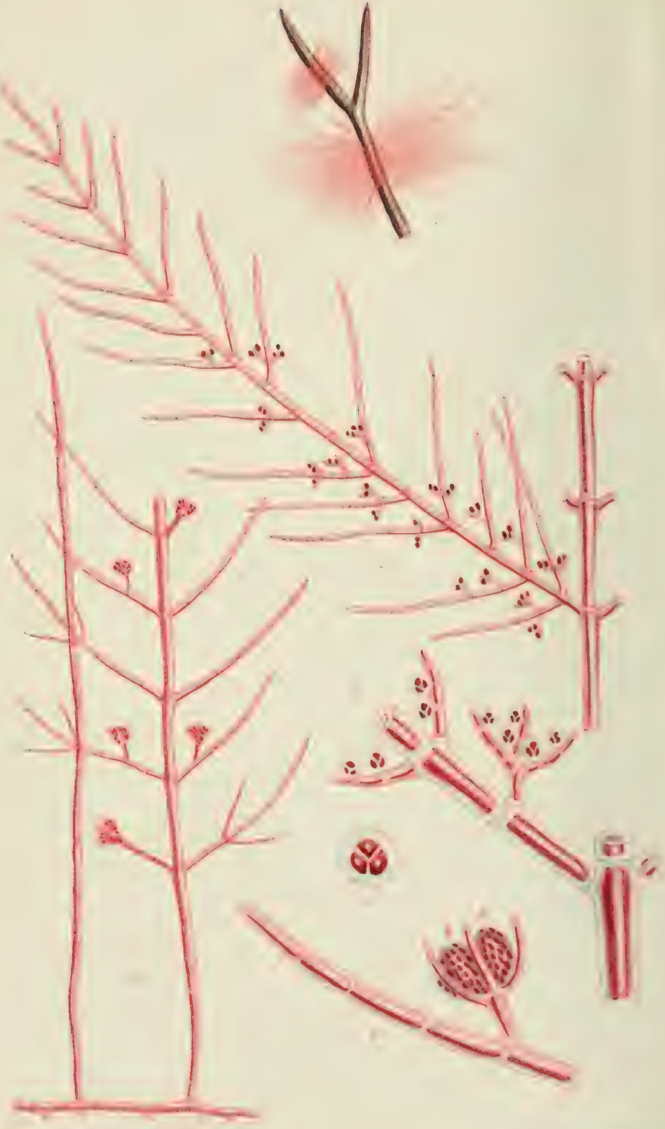

PLATE CLXXIX.

CALLITHAMNION TURNERI, *Ag.*

GEN. CHAR. *Frond* rosy, or brownish-red, filamentous; stem either opake and cellular, or translucent and jointed, branches jointed, one-tubed, mostly pinnate (rarely dichotomous or irregular); dissepiments hyaline. *Fruit* of two kinds on distinct plants; 1, external *tetraspores*, scattered along the ultimate branchlets, or borne on little pedicels; 2, roundish or lobed, berry-like *receptacles* (*favellæ*) seated on the main branches, and containing numerous angular spores. CALLITHAMNION (*Lyngb.*), from καλος, *beautiful*, and θαμνιον, a *little shrub.*

CALLITHAMNION *Turneri*; filaments rising from creeping fibres, simple or repeatedly branched, once or twice pinnated with opposite, spreading simple ramuli; articulations of the main filaments 5–10 times longer than broad; tetraspores clustered, subracemose or corymbose, favellæ involucrated, stalked.

CALLITHAMNION Turneri, *Ag. Syst. Alg.* vol. ii. p. 100. *Harv. in Hook. Br. Fl.* vol. ii. p. 339. *Wyatt, Alg. Danm.* no. 183. *Harv. in Mack. Fl. Hib.* part 3. p. 217. *Harv. Man.* p. 114. *J. Ag. Alg. Medit.* p. 70. *Endl. 3rd Suppl.* p. 34. *Kütz. Phyc. Gen.* p. 373.

CALLITHAMNION repens, *Lyngb. Hyd. Dan.* p. 128. t. 40. *Ag. Spec. Alg.* vol. ii. p. 184. *Harv. in Hook. Br. Fl.* vol. ii. p. 348. *Harv. in Mack. Fl. Hib.* part 3. p. 218. *Harv. Man.* p. 115. *Kütz. Phyc. Gen.* p. 372.

CALLITHAMNION variabile, *Ag. Sp. Alg.* vol. ii. p. 163? *Kütz. Phyc. Gen.* p. 372.

CERAMIUM Turneri, *Roth. Cat.* vol. iii. p. 128. t. 5. *Ag. Syst.* p. 142. *Grev. Crypt.* t. 355.

CERAMIUM repens, *Ag. Syn.* p. 63. *Ag. Syst.* p. 131.

CONFERVA Turneri, *Dillw.* t. 100. *E. Bot.* t. 2339 (*not.* t. 1637).

CONFERVA repens, *Dillw.* t. 18. *Roth. Cat.* vol. iii. p. 221. *E. Bot.* t. 1608. *Fl. Dan.* t. 1665.

CONFERVA tenella, *Dillw. Syn.* p. 72. t. F.

HAB. Parasitical on other Algæ, between tide marks. Annual. Summer. Not uncommon.

GEOGR. DISTR. Atlantic shores of Europe and North America. Mediterranean Sea.

DESCR. *Filaments* rising from numerous prostrate fibres which creep, by means of small, discoid roots, over the surface of other plants, densely tufted, one to two inches high, capillary, simple or repeatedly branched; the branches very generally opposite, sometimes alternate, spreading, pinnated or bipinnated with simple, slender, elongated, patent, opposite, or rarely alternate ramuli. *Articulations* of the main stem from five to ten times longer than broad; those of the ramuli 4–5 times; all with a narrow endochrome, bordered by a wide hyaline coat. *Dissepiments* broad. *Tetraspores* globose, with wide margins, sessile on the sides of short, simple, or branched peduncles, which rise from the ramuli near their base. *Favellæ* mostly bilobed, involucrate, borne on lateral peduncles, or terminating shortened ramuli. *Substance* flaccid, adhering to paper. *Colour* a fine rose red, soon fading in fresh water. Sometimes the ramuli are alternate, and then the plant becomes *C. repens* of authors.

This pretty little species of *Callithamnion* was named by Dr. Roth after its discoverer Mr. Dawson Turner, the celebrated author of the Historia Fucorum and numerous other learned works. It was first observed on the Norfolk coast; and has since been found on most of the shores of Europe, where it not uncommonly creeps over the fronds of various small Algæ.

After as careful study as I have been able to give the subject, I am persuaded that *Cal. repens* of authors is nothing more than an imperfectly developed state of this species, in which either the plant is in a very young state, or, if more fully grown, the branches are mostly alternate. I have examined numerous specimens in which the alternate and opposite branching occurs in different parts of the same specimens; and as this is the chief character insisted on by those who contend for two species, its failure must destroy one of them. The form which has been called *C. Turneri* exhibits the species in its most perfect state, and therefore this name, apart from its commemorative significancy, deserves to be retained.

The fructification of this species differs in some respects from that of other *Callithamnia*, and shows an approach to *Griffithsia*, especially in the involucrated favellæ. The tetraspores are, however, not so regularly disposed as in that genus; and the habit is much more like that of *Callithamnion*.

Fig. 1. CALLITHAMNION TURNERI:—*of the natural size.* 2. Branch with *tetraspores.* 3. Portion of the same. 4. A tetraspore. 5. Portion of a filament with favellæ. 6. Ramulus and pedunculate favella.

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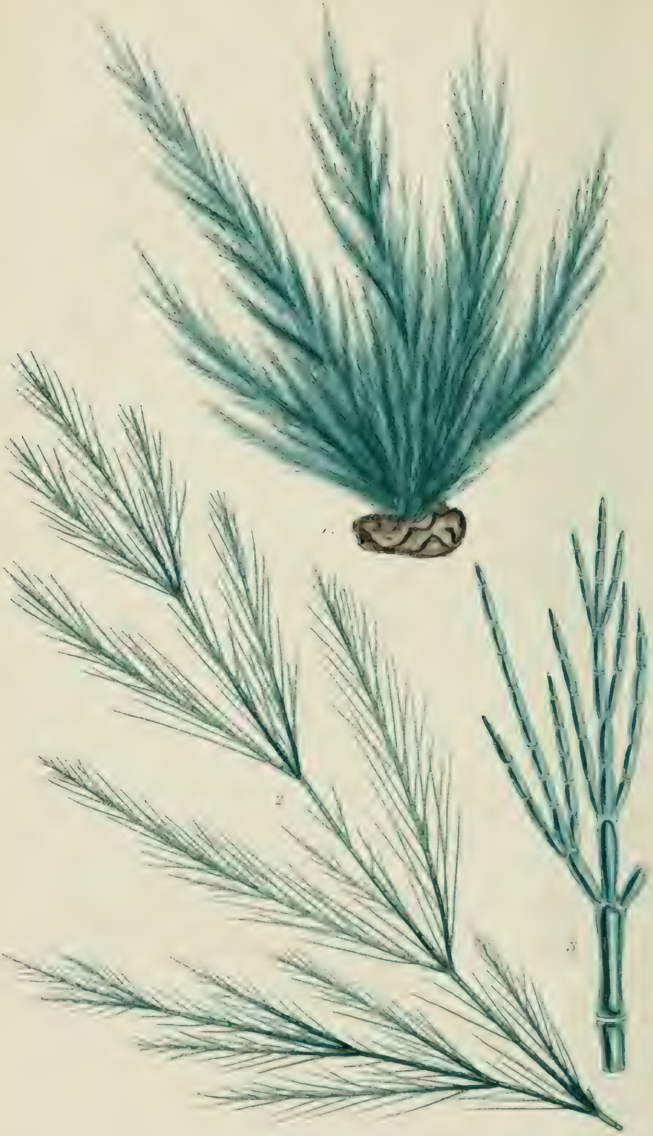
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PLATE CLXXX.

CLADOPHORA RUPESTRIS, *Kg.*

GEN. CHAR. *Filaments* green, jointed, attached, uniform, branched. *Fruit,* aggregated granules or zoospores, contained in the joints, having, at some period, a proper ciliary motion. CLADOPHORA (*Kütz.*),—from κλαδος, a *branch,* and φορεω, to *bear.*

CLADOPHORA *rupestris*; filaments capillary, rigid, dark green, straight, tufted, bushy; branches erect, crowded, densely clothed with appressed, opposite, or tufted, subulate ramuli; articulations three or four times longer than broad.

CLADOPHORA rupestris, *Kütz. Phyc. Gen.* p. 270.

CONFERVA rupestris, *Linn. Sp. Pl.* p. 1637. *Huds. Fl. Ang.* p. 601. *Lightf. Fl. Scot.* p. 994. *With. Br. Pl.* vol. iv. p. 140. *Fl. Dan.* t. 948. *Roth, Cat. Bot.* vol. ii. p. 238. *Dillw. Conf.* t. 23. *E. Bot.* t. 1699. *Ag. Syn.* p. 91. *Lyngb. Hyd. Dan.* p. 156. t. 54. *Ag. Syst.* p. 117. *Harv. in Hook. Br. Fl.* vol. ii. p. 357. *Wyatt, Alg. Danm.* no. 95. *Harv. in Mack. Fl. Hib.* part 3. p. 229. *Harv. Man.* p. 136.

CONFERVA glauca, *Roth, Cat. Bot.* vol. ii. p. 208. t. 6.

CONFERVA virgata, *Roth, Cat. Bot.* vol. i. p. 195.

Var. β. *distorta*; tufts rooting in the mud, depressed; filaments short, much curled, and matted together; ramuli squarrose.

HAB. On rocks in the sea, between tide-marks; also beyond the limits of low water. Annual. Summer and autumn. Abundant on all the British shores. β. On submarine peat, at Birturbui Bay, Connemara, *Mr. Mc Calla.*

GEOGR. DISTR. Atlantic shores of Europe. Baltic Sea.

DESCR. *Root* (except in var. β.) scutate. *Filaments* densely tufted, from four to six or eight inches in length, thicker than human hair, very much branched. *Branches* virgate, long, straight, repeatedly divided, set with opposite or quaternate, very erect, lesser branches, which are more or less furnished with ramuli. *Ramuli* closely appressed, subulate, tapering to a fine point, opposite, or occasionally alternate, or three or four rising from the same articulation, the pairs more or less approximating together. *Articulations* from three to five times longer than broad, slightly contracted at the dissepiments, filled with a dense endochrome. *Substance* rigid, not adhering to paper in drying. *Colour* a beautiful dark green, sometimes, especially when growing in deep water, reflecting glaucous tints.

A very beautiful plant, when well grown, common on all our rocky shores, and extending through the whole of the littoral zone, even into the belt of the *Laminariæ.* Specimens gradually increase

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in luxuriance, and in the purity and depth of their colour, as their habitat is remote from high water; and those which are collected in deep rock-basins, at the verge of the tide, are remarkably handsome. So common a plant could not escape notice from the earliest time, and consequently we find it mentioned both in Theophrastus and Dioscorides. A characteristic figure, for the age, is given by Dillenius; and it received its present name in the Species Plantarum of Linnæus.

Though it varies in some degree in the number of its ramuli, which on some specimens are closely crowded together, distant and few on others; yet there is always such a similarity in habit between all states of the plant, and such an identity of colour (and that a remarkably *dark* colour for the genus), that few persons who have once seen this species will mistake it for anything else. The only puzzling variety which I have met with is what I have called var. β. *distorta,* and this is only puzzling if seen for the first time in the study. In the field it still retains so much of the appearance of stunted forms of the species, that its difference of general habit does not deceive a practised eye; and its *habitat* is quite sufficient to account for the distorted forms it assumes. It is found, in the locality indicated, forming scab-like patches on the naked surface of the peat, just within the limit of the tide, in company with *Codium amphibium* and *Catenella opuntia.* A habitat more unlike that usually occupied by *C. rupestris* can scarcely be imagined. The species is therefore struggling hard against circumstances, on the confines of its capability of growing.

Fig. 1. CLADOPHORA RUPESTRIS—tuft:—*of the natural size.* 2. Portion of a branch:—*magnified.* 3. Some of the ramuli:—*more highly magnified.*

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Plate CLXXVI.

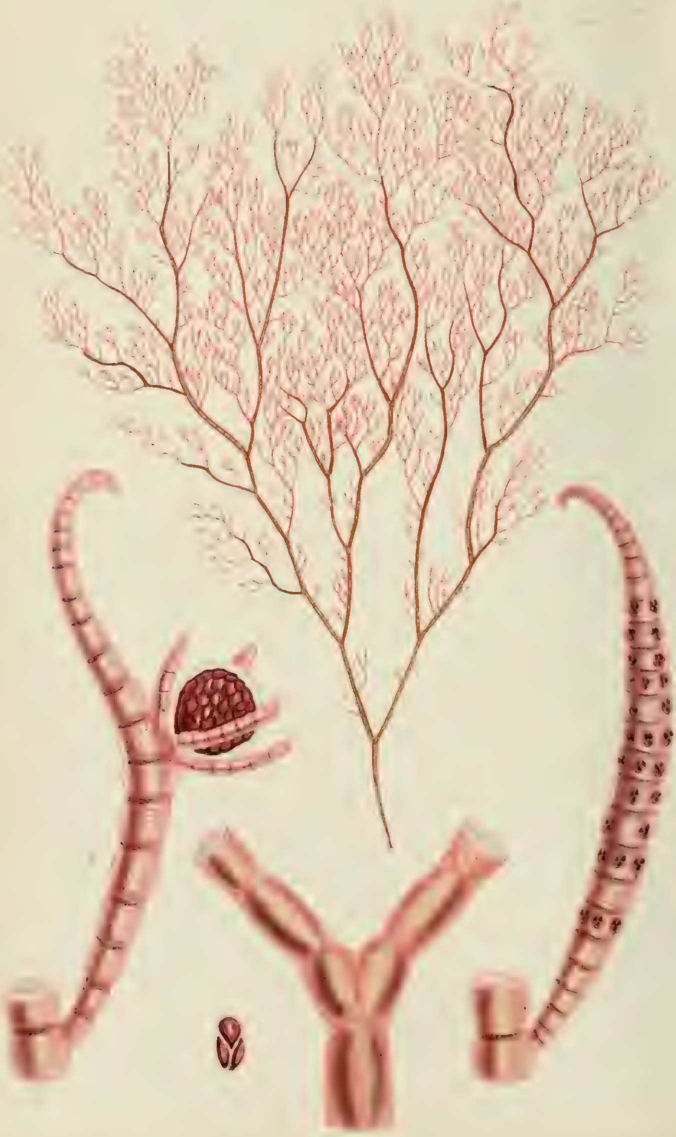

PLATE CLXXXI.

CERAMIUM RUBRUM, *Ag.*

GEN. CHAR. *Frond* filiform, one-tubed, articulated; the dissepiments coated with a stratum of coloured cellules, which sometimes extend over the surface of the articulation. *Fructification* of two kinds, on distinct individuals; 1, *tetraspores,* either immersed in the ramuli, or more or less external; 2, sessile, roundish *receptacles* (*favellæ*), having a pellucid limbus, containing minute, angular spores, and subtended by one or more short, involucral ramuli. CERAMIUM (*Roth*),—from κεραμος, a *pitcher,* but the fruit is not pitcher-shaped.

CERAMIUM *rubrum*; filaments robust, gradually attenuated upwards, irregularly dichotomous, with lateral, forked or multifid ramuli, the apices hooked inwards; articulations coated with coloured cellules, unarmed, the lowermost twice as long as broad, the upper shorter than their breadth; dissepiments constricted; tetraspores immersed in the articulations, whorled; favellæ globose, mostly borne on the lateral branchlets, subtended by three or four involucral ramuli.

CERAMIUM rubrum, *Ag. Syn.* p. 60. *Lyngb. Hyd. Dan.* p. 118. tab. 62. B. 1. *Hook. Fl. Scot.* part 2. p. 84. *Ag. Syst.* p. 135. *Grev. Fl. Edin.* p. 310. *Ag. Sp. Alg.* vol. ii. p. 146. *Harv. in Hook. Brit. Fl.* vol. ii. p. 336. *Wyatt, Alg. Danm.* no. 42. *Harv. in Mack. Fl. Hib.* part 3. p. 210. *J. Ag. Alg. Medit.* p. 81. *Endl. 3rd Suppl.* p. 36. *Kütz. Phyc. Gen.* p. 381.

CERAMIUM virgatum, *Roth, Cat. Bot.* vol. i. t. 8. f. 1. *Fl. Germ.* p. 461.

CERAMIUM elongatum, *Roth, Cat.* vol. ii. p. 178. *DC. Fl. Fr.* vol. ii. p. 44.

CERAMIUM axillare, *DC. Syn.* p. 9.

CERAMIUM nodulosum, *Ducluz. Ess.* p. 61 *DC. Syn.* p. 9.

CONFERVA rubra, *Huds. Fl. Ang.* p. 600. *With. Br. Pl.* vol. iv. p. 138. *E. Bot.* t. 1166. *Dillw. Conf.* t. 34. *Fl. Dan.* t. 1482.

CONFERVA nodulosa, *Lightf. Fl. Scot.* p. 994.

CONFERVA tubulosa, *Huds. Fl. Ang.* p. 600.

CONFERVA flosculosa, *Ellis. Phil. Tr.* 57. p. 425. t. 18.

Var. β. *secundatum*; lateral ramuli mostly secund.

CERAMIUM secundatum, *Lyngb. Hyd. Dan.* p. 119. t. 18.

HAB. Growing on rocks, stones, and the smaller Algæ in rock-pools from near the extreme of high water to low-water mark; also dredged in four or five fathoms. Annual. Summer and autumn. Very abundant on all parts of the British coasts.

GEOGR. DISTR. Abundant throughout the temperate zones of both hemispheres; also in the tropical ocean, both east and west.

DESCR. *Root* scutate. *Filaments* solitary or tufted, from one or two to twelve inches long, or more, as thick as hog's bristle, or twice as thick in the lower part, gradually attenuated upwards, irregularly dichotomous at longish intervals, and furnished more or less copiously with lateral simple, forked, or repeatedly dichotomous ramuli: the axils patent; the apices either hooked inwards or straight. Minor characters of branches excessively variable. *Articulations* opake, coated with a thick stratum of small coloured cells, marked (frequently) with an oval area, being an internal air-cell or tube, seen through the coat; dissepiments contracted. *Favellæ* involucrate, spherical, borne on the sides of lateral short ramuli. *Tetraspores* immersed in the substance of the articulations, several in each articulation, in a transverse line. *Colour*, where the plant is in perfection, a fine, deep, clear-red; varying to all shades of red-brown, fulvous, yellow, and even greenish, down to white. *Substance* membranaceous or cartilaginous. It more or less perfectly adheres to paper.

This plant, one of the most universally diffused of the *Florideæ*, and one of the commonest on every shore where it grows, puts on so many deceptive appearances that the young botanist and even the experienced observer are again and again deceived by it. As it grows from near the limit of high water to beyond the recess of the tide, it is exposed to a very variable amount of solar light and heat, a circumstance which at once accounts for the varieties in colour which the frond assumes. The variations in ramification depend on more hidden causes: but they are such that, however dissimilar different specimens may seem, other intermediate states may in most instances be detected which perfectly connect them. Still it is *possible* that the specific characters above given may apply to more than one species. I now allude to a virgate plant which I have hitherto regarded as a variety of *C. rubrum*, but which may ultimately, perhaps, be admitted to rank as a species, should a more definite character be discovered to distinguish it. The *Ceramia* are almost as unsatisfactory to the botanist as the *Rubi*; and their varieties quite as numerous. They are, however, very beautiful plants, and thus, in some degree, the botanist is repaid for the trouble which their investigation often occasions.

Fig. 1. CERAMIUM RUBRUM:—*of the natural size.* 2. Ramulus with a favella. 3. Ramulus with imbedded tetraspores. 4. Tetraspores. 5. Portion of the main filaments:—*all magnified.*

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Plate CLXXXIII.

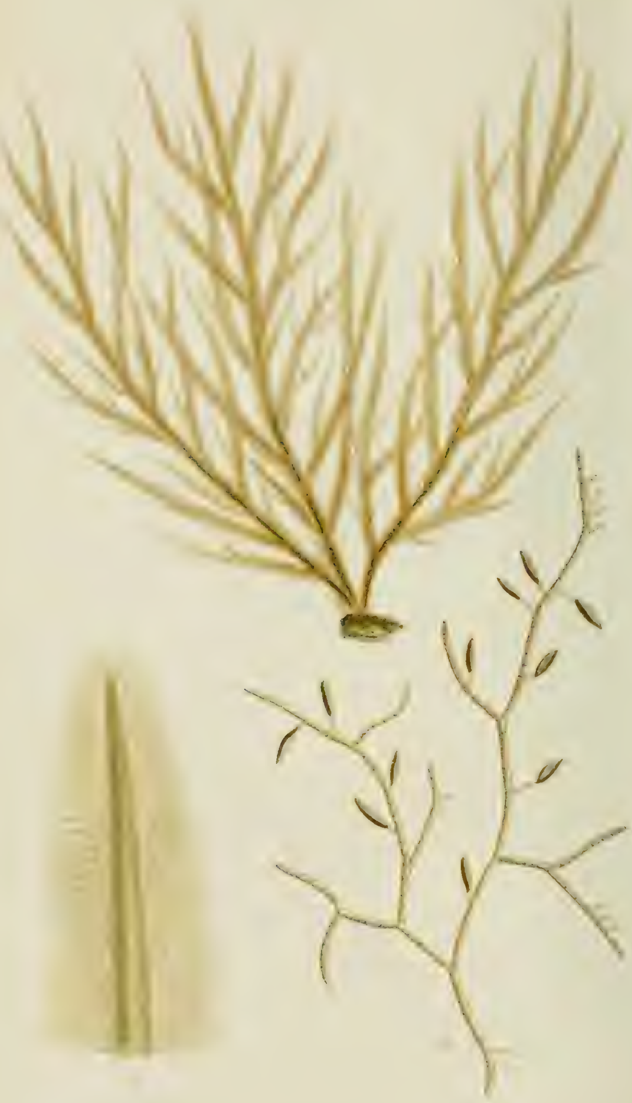

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PLATE CLXXXII.

ECTOCARPUS TOMENTOSUS, *Lyngb.*

GEN. CHAR. *Frond* capillary, jointed, olive or brown, flaccid, single-tubed. *Fruit* either spherical, elliptical, or lanceolate *utricles* (or *spores*) borne on the ramuli, or imbedded in their substance. ECTOCARPUS (*Lyngb.*),—from εκτος, *external,* and καρπος, *fruit.*

ECTOCARPUS *tomentosus*; filaments very slender, flexuous, irregularly branched, interwoven into a dense, sponge-like, branching frond; utricles stalked, linear-oblong, obtuse.

ECTOCARPUS tomentosus, *Lyngb. Hyd. Dan.* p. 132. t. 44. *Ag. Syst.* p. 163. *Ag. Sp. Alg.* vol. ii. p. 44. *Grev. Crypt. Fl.* t. 316. *Harv. in Hook. Br. Fl.* vol. ii. p. 326. *Harv. in Mack. Fl. Hib.* part 3. p. 181. *Wyatt, Alg. Danm.* no. 37. *Endl. 3rd Suppl.* p. 21. *Kütz. Phyc. Gen.* p. 290.

CERAMIUM tomentosum, *Ag. Syn.* p. 64. *Hook. Fl. Scot.* part 2. p. 86.

CHANTRANSIA tomentosa, *Endl. 3rd Supp.* p. 21.

CONFERVA tomentosa, *Huds. Fl. Ang.* p. 594. *Lightf. Fl. Scot.* p. 982. *With. Br. Pl.* vol. iv. p. 130. *Dillw. Brit. Conf.* t. 56. *Roth. Cat.* vol. ii. p. 180. and vol. iii. p. 147.

HAB. Parasitic on *Fucus vesiculosus, Himanthalia lorea,* and other Algæ, between tide-marks; occasionally on rocks and stones. Frequent on the British coasts. Annual. Summer.

GEOGR. DISTR. Atlantic shores of Europe and America. Cape Horn, *Dr. Hooker.*

DESCR. Spongy fronds (composed of innumerable densely matted filaments) from one to eight inches or more in length, sometimes half an inch in diameter below, usually much less, commonly from half a line to one or two lines, very much branched; branches alternate or irregular, filiform, crowded, simple, or bearing a second or third series of lesser branches; when spread out in the water beautifully feathered with the free portion of the filaments of which they are composed; collapsing, on removal from the water, into a spongy subgelatinous mass. *Filaments* very slender, equal, flexuous, very irregularly branched, the branches patent or divaricating, alternate or secund, often very short. *Articulations* twice or thrice as long as broad, more or less pellucid. *Utricles* linear-oblong, or somewhat elliptical, obtuse, borne on little stalks, rising from all parts of the lesser branches. *Colour* varying from a pale olive green to a rusty brown. *Substance* soft, and somewhat gelatinous; closely adhering to paper in drying.

* * *

From all the British species of *Ectocarpus* this is at once distinguished by a remarkable difference in habit, the filaments being aggregated together, intertwined, and even firmly compressed into a branching frond, which at first sight is not unlike the spongy frond of a *Codium.* In some specimens this character is much more strongly developed than in others, the branches in them being singularly rope-like; while in an opposite variety the tips of the filaments and their lateral divisions are so nearly free that the plant assumes quite a feathery aspect.

On different parts of the coast this species differs much in size. It appears to flourish best in the north, especially in muddy, land-locked bays. Some specimens gathered by Dr. Greville in Staffa and Iona, and figured in that author's admirable Crypt. Flora, are exceedingly luxuriant; and I possess others from Carrickfergus of nearly equal beauty. The colour, too, is subject to much variation, but this is probably dependent on age, becoming more and more rusty as the season advances.

E. tomentosus was among the earliest of the genus noticed by botanists. It is described in the Historia Muscorum of Dillenius, and rudely figured at Tab. 3. f. 13. of that great work. Such at least is the opinion of Dillwyn: but Agardh refers the description and figure to his *E. compactus,* a plant which, to judge by the specimens which I have seen, is only an old and matted state of *E. littoralis.*

Fig. ECTOCARPUS TOMENTOSUS:—*of the natural size.* 2. A small part of the fibrous frond:—*magnified.* 3. Portion of a filament: *highly magnified.*

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Plate CLXXXIII.

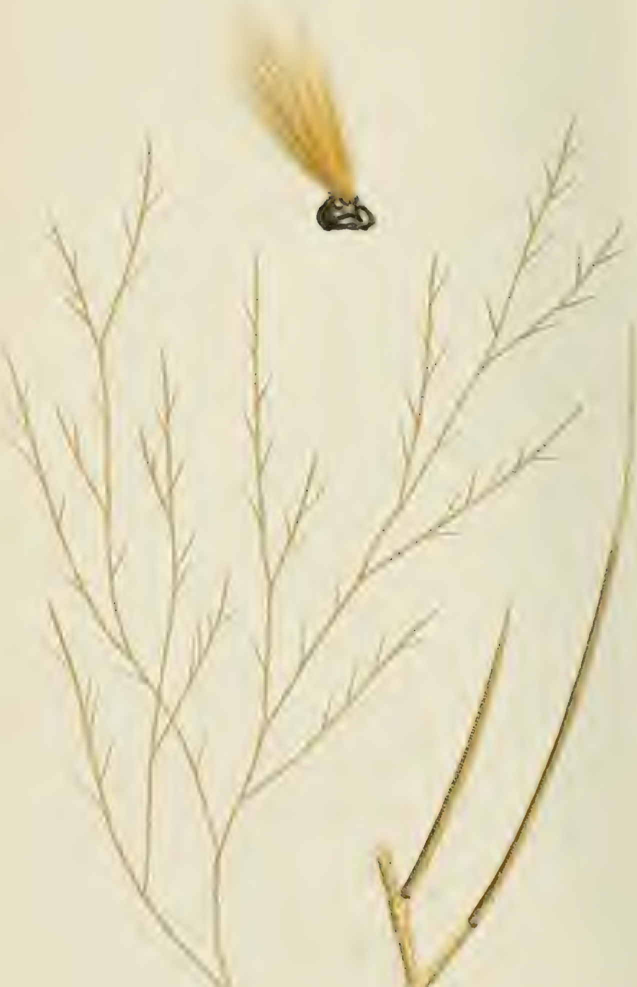

PLATE CLXXXIII.

ECTOCARPUS AMPHIBIUS, *Harv.*

GEN. CHAR. *Frond* capillary, jointed, olive or brown, flaccid, single-tubed. *Fruit* either spherical, elliptical, or lanceolate *utricles* (or *spores*) borne on the ramuli, or imbedded in their substance. ECTOCARPUS (*Lyngb.*),—from εκτος, *external,* and καρπος, *fruit.*

ECTOCARPUS *amphibius*; tufts short, loose, soft, pale olive; filaments very slender, subdichotomous; ultimate branches alternate, spreading; articulations two or three times longer than broad; utricles (?) linear-attenuate, spine-like, mostly sessile, scattered.

ECTOCARPUS amphibius, *Harv. Phyc.* vol. i. p. x.

HAB. In muddy ditches of brackish water, near the coast. Tide ditches, communicating with the Avon, below Bristol. *Mr. G. H. K. Thwaites.*

GEOGR. DISTR.

DESCR. *Filaments* 2–3 inches long, very slender, flaccid, forming small, indefinite tufts, growing on the mud, or attached to various substances, vaguely branched in a manner between dichotomous and alternate; the lesser divisions mostly alternate, erecto-patent, not much divided, nor remarkably attenuate. *Ramuli* scattered, thorn-like, at length frequently changed into exceedingly long, sessile, opake, sporaceous bodies, evidently analogous to the utricle of *Ectocarpus siliculosus*, and of a character intermediate between these and the immersed fructification of *E. littoralis*. *Articulations* of the main branches twice or thrice as long as broad, pale olive, pellucid, mostly marked with a few irregular bands of more solid endochrome. *Colour* fading in the Herbarium, and becoming greener. In drying, it closely adheres to paper.

The occurrence of an *Ectocarpus* in brackish water, though not without precedent, deserves to be recorded, and it is more on that account, than because I am certain of the present plant being a good species, that I give it a place in this work. It will be seen that its characters border very closely on those of *E. siliculosus*, from which the usually sessile fructification and the attenuated form of this part chiefly distinguish it. The resemblance is so striking that one is almost disposed to the belief that our *E. amphibius* may be only *E. siliculosus* altered by growing in water which contains a very small quantity of salt. Mr. Thwaites, to whom I am indebted for a beautifully mounted specimen, and who also had the kindness to communicate fresh specimens, gathered it in ditches near Bristol, into which the tide flows. It will probably be found to occur in similar situations elsewhere.

Fig. 1. Ectocarpus amphibius; a tuft:—*of the natural size.* 2. A branch:—*magnified.* 3. Fertile ramuli:—*highly magnified.*

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Plate CLXXXIV.

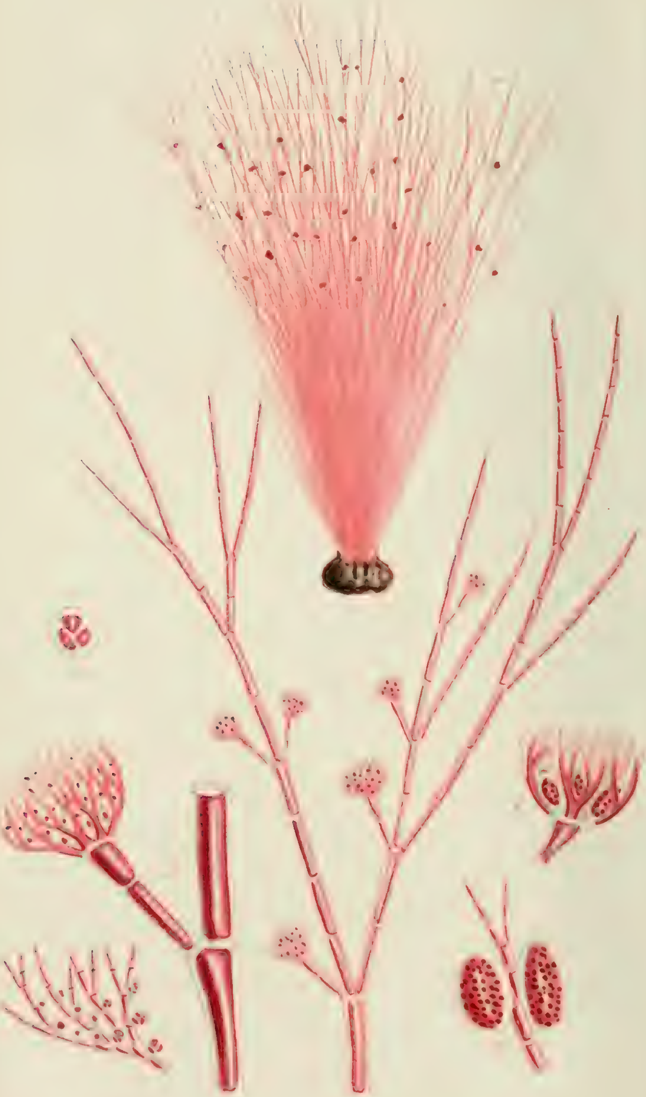

PLATE CLXXXIV.

GRIFFITHSIA SETACEA, *Ag.*

GEN. CHAR. *Frond* rosy-red, filamentous; filaments jointed throughout, mostly dichotomous; ramuli single-tubed; dissepiments hyaline. *Fructification* of two kinds on distinct individuals; 1, *tetraspores* affixed to whorled involucral ramuli; 2, gelatinous *receptacles* (*favellæ*) surrounded by an involucre, and containing a mass of minute, angular spores. GRIFFITHSIA (*Ag.*),—in honour of *Mrs. Griffiths*, the most distinguished of British Algologists.

GRIFFITHSIA *setacea*; filaments setaceous, straight, rigid, dichotomous, or subdichotomous; axils very acute; lesser branches sometimes opposite, attenuated to a point, erect; articulations cylindrical, five or six times longer than broad; involucres (of both kinds) pedunculate, lateral.

GRIFFITHSIA setacea, *Ag. Syn.* p. xxviii. *Ag. Syst.* p. 144. *Ag. Sp. Alg.* vol ii. p. 129. *Grev. Fl. Edin.* p. 312. *Hook. Br. Fl.* vol. ii. p. 338. *Harv. in Mack. Fl. Hib.* part 3. p. 212. *Wyatt, Alg. Danm.* no. 137. *Harv. Man.* p. 103. *Endl. 3rd Suppl.* p. 35. *Kütz. Phyc. Gen.* p. 373. *Hook. fil. Fl. Ant.* vol. i. p. 191.

CONFERVA setacea, *Ellis, Phil. Trans.* vol. 57. t. 18. f. *e*. *Turn. Linn. Tr.* vol. vii. p. 107. *Huds. Fl. Ang.* p. 599. *With.* vol. iv. p. 137. *E. Bot.* t. 1689. *Dillw. Conf.* t. 82. *Roth, Cat. Bot.* vol. iii. p. 278.

HAB. On the perpendicular sides of deep rock pools, near low-water mark, under the shade of larger Algæ. Perennial. Fruiting in spring and summer. Frequent on the British shores, from Orkney to Cornwall. Channel Islands.

GEOGR. DISTR. Atlantic shores of Europe and America. Southern Ocean, especially Tasmania.

DESCR. *Tufts* three to eight inches long, or more, dense, frequently interwoven in the lower part with tangled fibres. *Filaments* as thick as hog's bristle, sometimes not quite so thick, gradually attenuated from the base upwards, many times dichotomous at short intervals; the lesser divisions more irregular, alternate, or secund, frequently opposite; all the branches straight, and generally erect, with acute axils. Frequently small, root-like, irregular, horizontal ramuli issue from the sides of the main branches, and catching on a neighbouring branch, connect the filaments in a tangled web. Lesser branches gradually attenuated to the point. *Articulations* cylindrical; the lower ones five or six times as long as broad, or sometimes more; the upper gradually shorter, all containing bags of endochrome surrounded by a narrow border. *Involucres* of both kinds raised on short, lateral peduncles, about a line in length, scattered on the sides of the branches, those containing tetraspores most frequently found. *Tetraspores* spherical, attached to the inner faces of the dichotomous, involucral ramuli, with wide borders. *Favellæ* generally binate, oval, likewise attached to involucral ramuli, on distinct plants. *Antheridia*, or minute oval bodies, composed of dense whorls of exceedingly minute, glassy filaments, frequently occupy the place of tetraspores in the involucres. *Colour*, a fine transparent crimson, instantly discharged, with a crackling noise, in fresh water. *Substance* rather rigid and crisp, becoming flaccid after exposure to the air. In drying the plant adheres, but not very closely, to paper.

A long known and beautiful plant, found on all the British shores, and widely dispersed through the ocean; being found not only in the Atlantic, but in several parts of the Southern Pacific Ocean. From Van Dieman's Land I have seen very numerous specimens undistinguishable from British-grown ones.

When quite fresh, it is remarkably crisp and firm in substance, the points of its filaments standing firmly out, when the tuft is removed from the water. But it very rapidly becomes flaccid, and if dropped into fresh water, the membranous walls of its filaments burst asunder with violence, and with a sharp crackling noise, discharging the contents of the cells into the water. These form a fine powder of a brilliant carmine colour, and might, no doubt, be used as a pigment if the plant could be collected in sufficient quantity. Paper stained with this powder retains its brilliancy of colour in the Herbarium for many years. These remarks apply equally to other species of the genus.

I may add that, delicate as the structure of this plant assuredly is, no marine Alga is more patient of confinement, or may be more easily *domesticated*. A tuft placed in a closed bottle of sea water in April 1846, is now, after more than two years' imprisonment, apparently as fresh and healthy as when first taken from the sea. The water has not been changed, and is perfectly clear and pure. The plant has not grown much, as the bottle is a small one, but its threads reach nearly to the surface of the water; and no decay has taken place.

Fig. 1. GRIFFITHSIA SETACEA; tuft:—*of the natural size*. 2. Upper part of a fertile branch. 3. Involucre with *tetraspores*. 4. Ramulus from the same. 5. A tetraspore. 6. Involucre with *favellæ*. 7. Ramulus from the same:—*all more or less highly magnified*.

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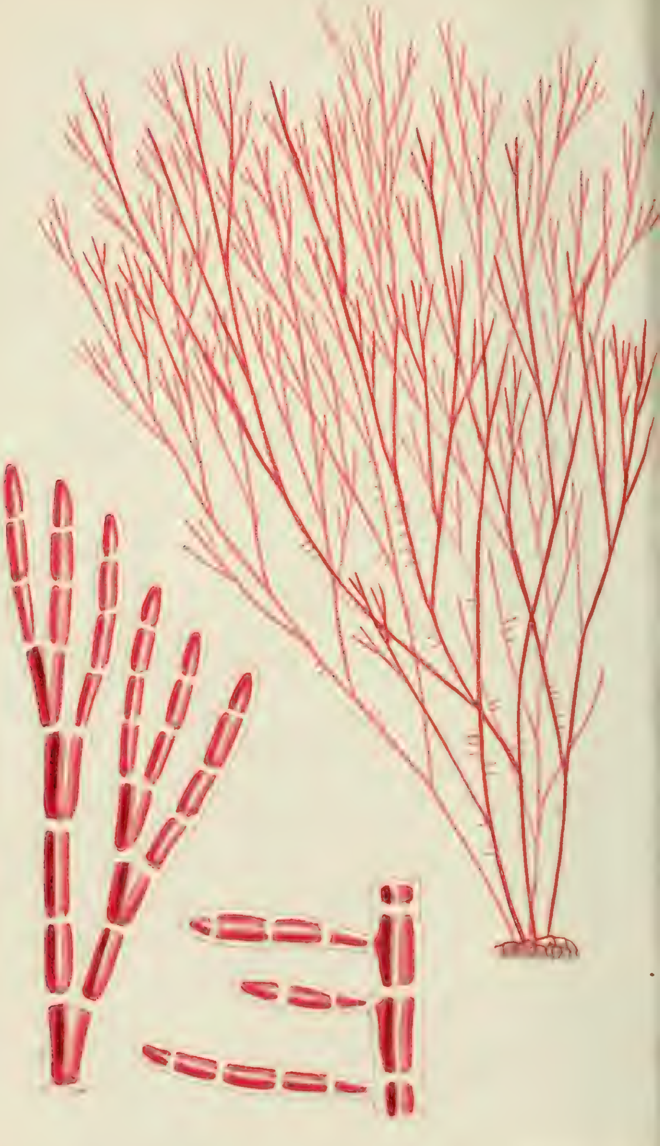

PLATE CLXXXV.

GRIFFITHSIA SECUNDIFLORA, *J. Ag.*

GEN. CHAR. *Frond* rosy-red, filamentous; filaments jointed throughout, mostly dichotomous; ramuli single-tubed; dissepiments hyaline. *Fructification* of two kinds on distinct individuals; 1, *tetraspores* affixed to whorled involucral ramuli. 2, gelatinous *receptacles* (*favellæ*) surrounded by an involucre, and containing a mass of minute, angular spores. GRIFFITHSIA (*Ag.*),—in honour of *Mrs. Griffiths*, the most distinguished of British Algologists.

GRIFFITHSIA *secundiflora*; filaments ultra-setaceous, somewhat gelatinous but firm, irregularly dichotomous, the lesser divisions flabellate; axils acute; branchlets fastigiate, obtuse, not tapering to a point; articulations cylindrical, two to four times as long as broad, with a very wide border; "involucres on very short, lateral peduncles."

GRIFFITHSIA secundiflora, *J. Ag. in Linn.* vol. xv. p. 39. *Alg. Medit.* p. 75. *Mont. Algier.* p. 141. *Endl. 3rd Supp.* p. 35.

GRIFFITHSIA crassa, *Kütz. Phyc. Gen.* p. 374.

GRIFFITHSIA intermedia, *Lenorm. in Herb.*

GRIFFITHSIA corallina β. *Bonn. Hyd. loc.* p. 96.

CERAMIUM corallinum, var. majus, *Desmaz. Crypt. Fr.* no. 1032.

CERAMIUM Desmazieri, *Crouan, MS.*

HAB. On rocks, at extreme low-water mark. Perennial? Discovered at Bovisand, near Plymouth, August, 1846, by the *Rev. W. S. Hore.*

GEOGR. DISTR. Atlantic coasts of France and Spain. Mediterranean Sea.

DESCR. *Filaments* originating in branched, decumbent, matted fibres; tufted, four to eight inches high, thicker than hog's bristle, not sensibly attenuated upwards, generally simple below for the space of one or two inches, afterwards repeatedly and more or less closely dichotomous, with somewhat of a fan-shaped outline; the lesser divisions not regularly forked but often alternately or secundly divided: all the divisions very erect, and the axils, especially the upper ones, narrow and acute. Lesser branches and ramuli not tapering upwards, and very blunt. *Articulations* with a very wide pellucid border and narrow endochrome, cylindrical or sometimes obscurely pyriform, the lowermost about four times, the upper about twice as long as broad. *Fructification* not as yet seen on British specimens. *Colour* a fine, full crimson, quickly discharged, with rupture of the membrane and curving of the branches, in fresh water. *Substance* between gelatinous and membranaceous, firm, closely adhering to paper in drying. Short, horizontal, secund, root-like ramuli, often issue from the lower part of the branches.

This noble species, one of the finest of the section to which it belongs, was added to the British Flora, in the year 1846, by the Rev.

W. S. Hore, who had the good fortune about the same time to discover a new species (*G. Devoniensis*) of this charming genus, which is already figured in our first volume. I delayed the publication of the present novelty in the hope that its fructification might be detected on British specimens; but this hope having hitherto been disappointed, I do not wish further to delay introducing so interesting a plant to British botanists, although my figure wants a representation of the fruit. I could certainly have figured *fruit* from an exotic specimen, had I thought it expedient to do so. The *favellæ* resemble those of *G. setacea*, but are raised on much shorter peduncles

From *G. setacea* this plant may, at once, be known by its larger size, its comparatively shorter joints, and more lubricous substance; but especially by the very obtuse, cylindrical, upper ramuli, which do not taper to a point, but are of equal diameter throughout. From *G. corallina*, which in many respects it resembles, its cylindrical articulations and different inflorescence distinguish it.

G. secundiflora, though first noticed as a variety by Bonnemaison, was not well understood until the younger Agardh pointed out its characters, and clearly distinguished it from *G. setacea* and *G. corallina*, to one or other of which it had formerly been referred. It is one of the most common of the genus in the Mediterranean, from several parts of which sea I have received specimens. It occurs less commonly on the coasts of France and Spain, and reaches its northern limit on the coast of England, in the same locality that produces the equally southern *Stenogramme* and *Carpomitra*. Dr. Hooker brought from the Falkland Islands specimens which we at first referred to this species; but which, as they offer some points of difference, we now regard, provisionally, as a distinct species (*G. antarctica*).

Fig. 1. Griffithsia secundiflora:—*of the natural size.* 2. Apex of a filament. 3. Part of the same, with root-like ramuli:—*magnified.*

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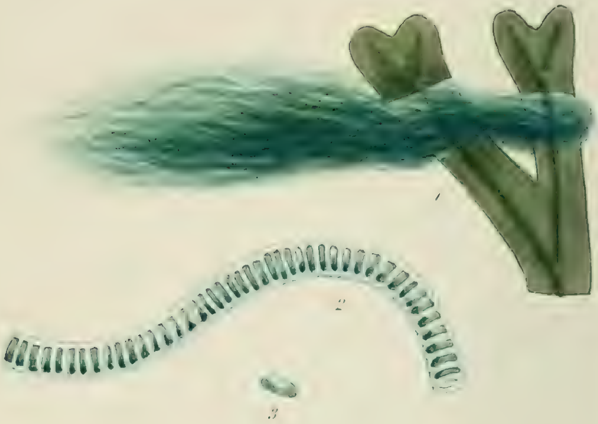
Plate CLXXXVI.

A.



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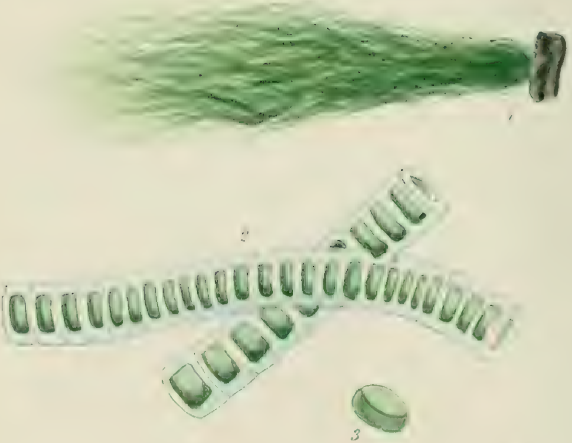

PLATE CLXXXVI. *A.*

LYNGBYA CARMICHAELII, *Harv.*

GEN. CHAR. *Filaments* destitute of a mucous layer, free, flexible, elongate, decumbent, not oscillating. *Tube* continuous; endochrome green or purple, densely annulated, and finally separating into lenticular *sporidia.* LYNGBYA (*Ag.*),—in honour of *Hans Christian Lyngbye,* author of an excellent work on the Algæ of Denmark.

LYNGBYA *Carmichaelii*; filaments very long, thickish, curled, and tortuous, cylindrical, forming extensive, grass-green, closely entangled strata; tube imperfectly jointed.

LYNGBYA Carmichaelii, *Harv. in Hook. Br. Fl.* vol. ii. p. 371. *Harv. Man.* p. 161. *Wyatt, Alg. Danm.* no. 230.

LYNGBYA crispa, *Carm. Alg. App. MS.* (*not of Ag.*)

HAB. On marine rocks, between tide marks; also on *Fuci, Zostera,* floating timber, &c. Annual. Summer. Appin, *Capt. Carmichael.* Plymouth and Torbay, *Mrs. Wyatt.* Cornwall, Swansea, Anglesea, &c., *Mr. Ralfs.* Jersey, *Miss White.* Several places on the Irish coast.

GEOGR. DISTR.

DESCR. Forming very widely spreading, closely interwoven strata, often many yards in diameter, spreading continuously over rocks, and investing any plant, or other object, which may obstruct its progress, covering them with a shaggy coat of an intense grass green. *Filaments* several inches long, floating freely in water, flaccid, at first straight, or but slightly curved, afterwards becoming very much curled and interwoven together. The colouring matter in an early stage nearly fills the tube, being divided into short portions, by closely approaching transverse striæ. As the season advances the endochrome gradually contracts, separating into distinct lenticular sporidia, a more or less perfect septum being visible between each. Finally, the sporidia burst through the tube, leaving it perfectly colourless. When dry, the filaments become a dull, dark green, without gloss: in this state they more or less adhere to paper.

One of the many discoveries of the late Capt. Carmichael of Appin, whose name it bears. The two species represented in this plate, while they are evidently closely allied to each other, differ in some degree from the true *Lyngbyæ,* approaching nearer to Agardh's genus *Sphæroplea.* There is a more distinct cellular division in the tube than is typical of the genus with which they are associated, and, perhaps, at a future time they may be removed. But the whole group requires revision, and deserves more attention than it has yet obtained. The present species I believe to be common to many parts of the British coast; but is, perhaps, often confounded with *Conferva tortuosa*, which it much resembles in habit and general aspect.

A. Fig. 1. Lyngbya Carmichaelii, growing on *Fucus vesiculosus*:—*of the natural size.* 2. Portion of a ripe filament. 3. A sporidium:—*both magnified.*

Plate CLXXXVI. *B.*

LYNGBYA SPECIOSA, *Carm.*

Lyngbya *speciosa*; filaments long, thick, flaccid, straight, at length curled, the margin crenate, forming bright yellow-green strata, glossy when dry; tube imperfectly jointed.

Lyngbya speciosa, *Carm. Alg. Appin. ined. Harv. in Hook. Br. Fl.* vol. ii. p. 371. *Harv. Man.* p. 161. *Wyatt, Alg. Danm.* no. 196.

Hab. On marine rocks, between tide-marks, and on *Fuci*. Annual. Summer. Appin, *Capt. Carmichael.* Paington, Torbay, *Mrs. Griffiths.* St. Michael's Mount, *Mr. Ralfs.*

Geogr. Distr.

Descr. This species, like *L. Carmichaelii*, forms widely spreading strata of a vivid green colour, covering the surface of rocks and *Fuci* with a fleecy coat, till lifted by the returning tide. The diameter of the filament is nearly twice as great as in *L. Carmichaelii*, the colour is greatly brighter, and the substance more gelatinous and glossy. In other respects the plants closely resemble each other. Filaments at first straight, three or four inches long, flaccid, at length becoming curled and crenate. *Endochrome* at first nearly filling the tube, gradually contracting as it solidifies, and at length formed into a lenticular sporidium, which, when ripe, bursts through the walls of the tube, leaving the filaments perfectly colourless. A more or less evident division into cells is observable.

This very pretty species is nearly related to the preceding, from which it is chiefly distinguished by the larger size, brighter colour, and more lubricous substance. It adheres far more closely to paper in drying, and does not so perfectly recover its form after having once been dried.

B. Fig. 1. Tuft of Lyngbya speciosa, on a rock:—*of the natural size.* 2. Portion of mature filaments. 3. A sporidium:—*all highly magnified.*

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Plate CLXXXVII.

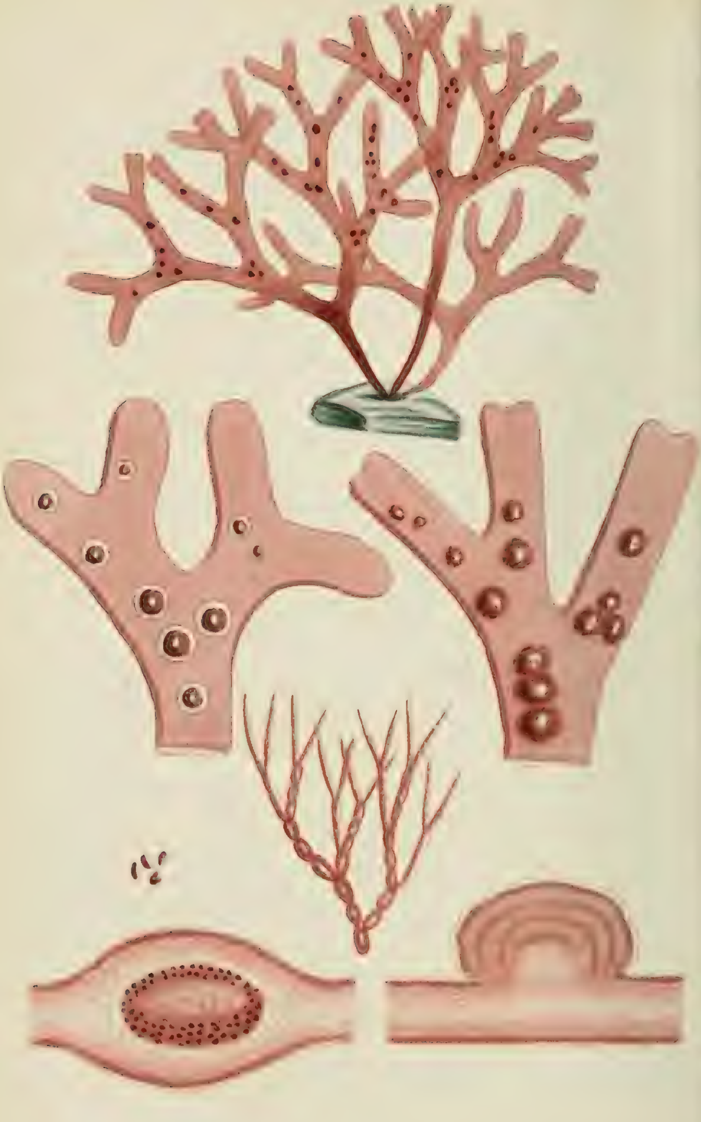

Plate CLXXXVII.

CHONDRUS NORVEGICUS, *Lamour.*

Gen. Char. *Frond* cartilaginous, nerveless, compressed or flat, flabelliform, dichotomously cleft; formed internally of three strata; the *inner*, of densely packed, longitudinal fibres; the *medial* of small roundish cells; the *outer*, of vertical, coloured, moniliform filaments. *Fructification*; 1, prominent *tubercles* (*nemathecia*) composed of radiating filaments, whose lower articulations are at length dissolved into *spores* (?); 2, *tetraspores* collected into sori, immersed in the surface of the frond; 3, *favellidia*, scattered through the surface, composed of minute *spores*. Chondrus (*Stack.*),—from χονδρος, *cartilage.*

Chondrus *Norvegicus*; frond linear, dichotomous, flat; the axils patent; the apices rounded; favellidia minute, imbedded in the substance, or prominent, sessile warts (*nemathecia*) scattered over both surfaces of the frond.

Chondrus Norvegicus, *Lamour. Ess.* p. 39. *Lyngb. Hyd. Dan.* p. 16. *Grev Alg. Brit.* p. 130. *Harv. Man.* p. 77. *Harv. in Mack. Fl. Hib.* part 3. p. 202. *Wyatt, Alg. Danm.* no. 120. *J. Ag. Alg. Medit.* p. 95. *Mont. Fl. Algier*, p. 117. *Endl. 3rd Suppl.* p. 39.

Sphærococcus Norvegicus, *Ag. Sp. Alg.* vol. i. p. 255. *Ag. Syst.* p. 218. *Spreng. Syst. Veg.* vol. iv. p. 335.

Oncotylus Norvegicus, *Kütz. Phyc. Gen.* p. 411.

Fucus Norvegicus, *Gunn. Fl. Norv.* vol. ii. p. 122. t. 3. f. 4. *Turn. Syn.* p. 222. *Turn. Hist.* t. 41. *E. Bot.* t. 1080. *Stack. Ner. Brit.* t. 18.

Fucus Devoniensis, *Grev. in Wern. Trans.* vol. iii. p. 396.

Hab. On rocks, near low-water mark. Annual? September to March. Rather rare. Dover and Swansea, *Dillwyn.* Exmouth, *Sir T. Frankland.* Devonshire (several places), *Mrs. Griffiths.* Sussex, *Mr. Borrer.* Falmouth Bay, *Miss Warren.* Mounts Bay, *Mr. Ralfs.* Plymouth, *Rev. W. S. Hore.* Bantry, *Miss Hutchins.* Youghal, *Miss Ball.* Miltown Malbay, &c., and Wicklow, *W. H. H.* Antrim, *Mr. Moore.* Saltcoats, *Rev. D. Landsborough.*

Geogr. Distr. Coast of Norway, *Gunner.* More frequent on the shores of France and Spain. Mediterranean Sea.

Descr. *Root*, an expanded callus. *Fronds* two to three inches high, more or less tufted, rising with a short, cylindrical stem, as thick as small twine, which soon forks, and almost immediately flattens, gradually widening till it becomes from an eighth to a quarter of an inch in width, again forks and repeats this process more or less regularly three or four times; the segments continuing nearly of the same breadth throughout and ending in a very blunt, simple, or emarginate point, all the axils remarkably patent. Sometimes there is scarcely any stem, the frond branching nearly from the base; in other specimens the undivided stipe is sometimes nearly two inches in length. *Fructification*: minute, depressed, spherical *favellidia*, immersed in the substance of the frond, and scattered through its upper segments, each with a pale margin, and filled with very numerous spores. 2, roundish or irregularly shaped *warts* (*nemathecia*), sessile on the frond, and densely scattered over its surface, wholly composed of vertical, dichotomous, moniliform filaments. *Substance* cartilaginous and firm, rather thin. *Colour* a deep, but dull, blood-red, paler, and more pinky in the younger parts. In drying, it does not adhere to paper.

The first account of this species is given by Bishop Gunner in his Flora Norvegica, if, indeed, the synonym of that author be correctly referred by Turner to this place; a fact which has been more than once suspected, many believing that the plant represented by Gunner is only a variety of *C. crispus*. Mr. Dillwyn was the first to detect it on the British shores, as well as the first to notice the nemathecia-fructification, which is the only kind described by Turner, and is much more generally produced than the tubercles; indeed, it is very rare to find a plant destitute of nemathecia. The *tubercles* have, I believe, only been found by Mrs. Griffiths at Torquay, and by her but seldom. They are at once distinguished from the nemathecia by their more regular form, and the colourless limb which surrounds them; and by being evidently immersed in the substance of the frond.

Chondrus Norvegicus, if it be identical with the northern plant described by Gunner, is singularly unfortunate in its specific name, as it is much more common to the south of Norway than in that country. Even in England, it is very much more abundant on the south coast, and occurs still more frequently on the shores of France and Spain, and in the Mediterranean. Though with a general resemblance to *C. crispus*, there is something in the tone of its colour, the divaricated laciniæ, and the rounded axils and apices that render it easy to be recognised, independently of the difference in fructification. The species most nearly allied to it is *C. crenulatus*, a native of Portugal, which may probably yet be added to the British list.

Fig. 1. CHONDRUS NORVEGICUS:—*of the natural size*. 2. Portion of a frond with *favellidia*. 3. Section of a *favellidium*. 4. Spores from the same. 5. Portion of a frond with *nemathecia*. 6. Section of a *nemathecium*. 7. Filament from the same:—*all more or less highly magnified.*

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CLXXXVIII

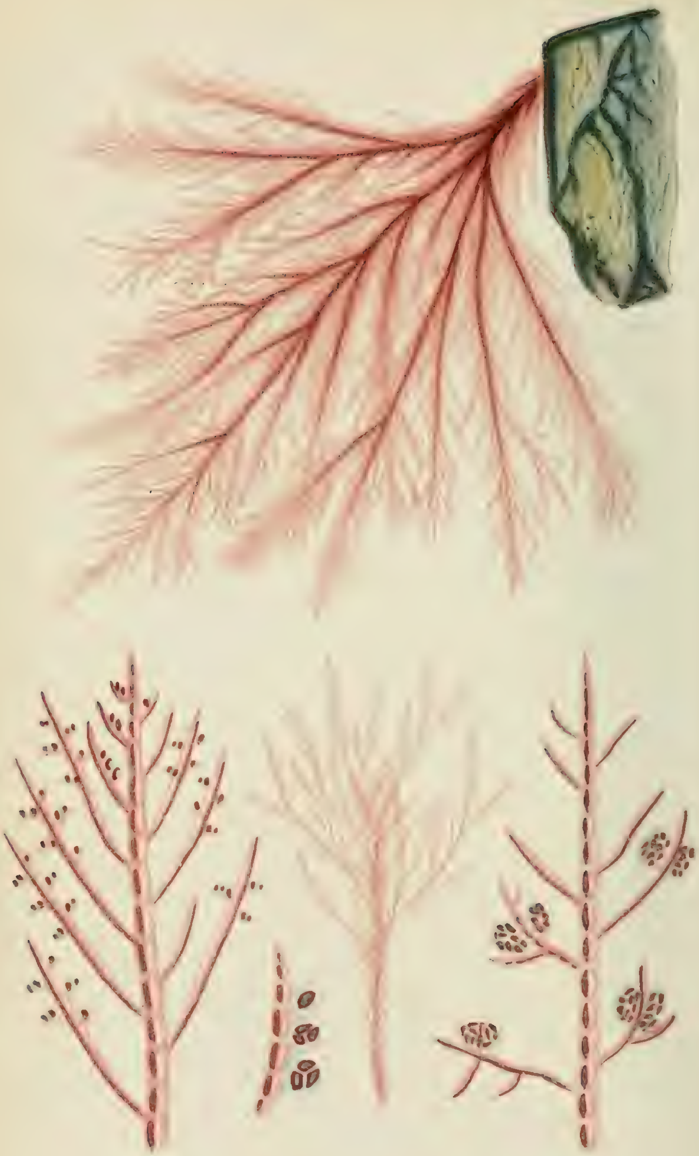

Plate CLXXXVIII.

CALLITHAMNION TETRICUM, *Ag.*

Gen. Char. *Frond* rosy or brownish red, filamentous; stem either opake and cellular, or translucent and jointed; branches jointed, one-tubed, mostly pinnate (rarely dichotomous or irregular); dissepiments hyaline. *Fruit* of two kinds, on distinct plants; 1, external tetraspores, scattered along the ultimate branchlets, or borne on little pedicels; 2, roundish or lobed, berry-like receptacles (*favellæ*) seated on the main branches, and containing numerous, angular spores. Callithamnion (*Lyngb.*), from καλος, *beautiful*, and θαμνιον, a *little shrub.*

Callithamnion *tetricum*; rigid, shrubby; stem and branches robust, densely covered with ramuli, shaggy below, plumulate above; plumules crowded, quadrifarious, simply pinnate; pinnæ acute, tapering to the base, erecto-patent; articulations twice or thrice as long as broad; tetraspores elliptical, minute, sessile on short lateral processes of the pinnæ.

Callithamnion tetricum, *Ag. Sp. Alg.* vol. ii. p. 179. *Harv. in Hook. Br. Fl.* vol. ii. p. 342. *Harv. in Mack. Fl. Hib.* part 3. p. 214. *Harv. Man.* p. 108. *Wyatt, Alg. Danm.* no. 141. *Endl.* 3rd *Suppl.* p. 34.

Phlebothamnion tetricum, *Kütz. Phyc. Gen.* p. 374.

Conferva tetrica, *Dillw.* t. 81. *E. Bot.* t. 1915.

Hab. On the perpendicular faces of rocks within tide marks, from half-tide level to low-water mark. Perennial. Summer. Common on the shores of the south of England and south and west of Ireland; less frequent on the east coast. Lambay, *Mr. Mc' Calla.* Channel Islands.

Geogr. Distr. Northern coasts of France, common.

Descr. *Root*, a large disc, densely covered with interwoven fibres. *Fronds* two to eight inches long, or more, tufted, fruticose; *stems* as thick, or twice as thick as pack-thread, much branched, the branches long, and either simple or again divided, alternate, spreading on all sides, and densely clothed with shaggy or hair-like, coarse, irregularly divided ramuli, so that the divisions of the frond have the appearance of rough ropes; upper and younger divisions clothed with longer and more slender branchlets, which bear alternate spreading plumules: similar plumules spring from all parts of the shaggy branches, growing among the irregular ramuli. *Plumules* long and narrow, simply pinnate, straight; pinnæ erecto-patent, tapering to an acute point, and much narrowed at base. *Articulations* about twice as long as broad, somewhat constricted at the dissepiments. *Tetraspores* two or three together, elliptical, minute, sessile on the inner faces of short ramuli, which issue from the sides of the pinnæ. *Favellæ* binate, borne on the pinnæ (frequently shortened) of less regular plumules. *Colour* a very dark, dull, brownish red. *Substance* rigid, not very closely adhering to paper, soon decaying in fresh water after the plant has been once dried, and then exhaling the odour of violets.

This is the coarsest of the British *Callithamnia*, resembling, in its bushy habit, shaggy tufts of *Sphacelaria scoparia*, and is often of a very dark brown colour, with little trace of the purple endochrome characteristic of the genus. At other times, much more shaggy specimens with a brighter colour are found, and some of these resemble large specimens of *C. Borreri*. Specimens collected at various seasons and from different localities differ much in the abundance and regularity of the plumules, as well as in the greater or less development of the hair-like ramuli. There are always, however, characters to be found quite sufficient to separate *C. tetricum* from any British species.

Mr. Dillwyn was the first author to notice this species, having found it abundantly in the neighbourhood of Swansea. He states that it is found generally in pools left by the tide, attached either to rocks or parasitical on Algæ. I have more commonly found it on the perpendicular faces of rocks which are left bare at low water, either perfectly exposed or shaded by hanging fronds of *Fucus serratus* and *nodosus*. In such situations, on the west of Ireland, it may often be found covering large spaces of rock, and growing luxuriantly.

None of our British species are very closely related to *C. tetricum*, but it is interesting to find in the *C. hirtum* of Auckland Islands, and *C. scoparium* of the Falklands, its southern analogues, resembling it in many respects, but readily distinguishable by obvious characters.

Fig. 1. CALLITHAMNION TETRICUM, tufts:—*of the natural size.* 2. Portion of an upper branch:—*slightly magnified.* 3. A plumule with tetraspores. 4. Ramulus from the same. 5. A plumule with favellæ:—*more highly magnified.*

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Plate CLXXXIX.

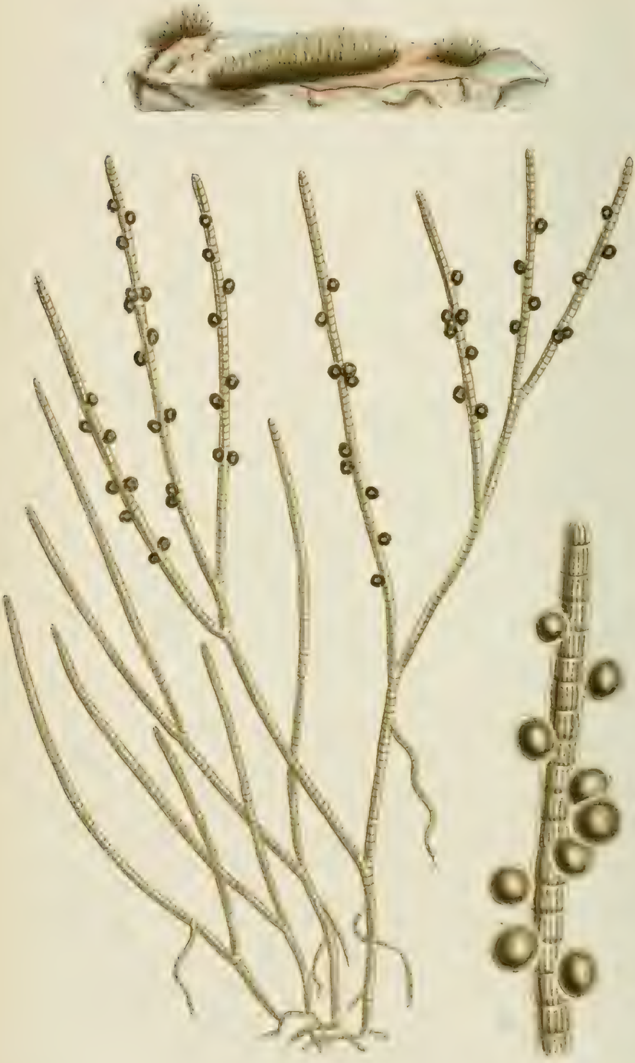

Plate CLXXXIX.

SPHACELARIA RADICANS, *Harv.*

Gen. Char. *Filaments* jointed, rigid, distichously branched, pinnated; rarely simple or subdichotomous. *Apices* of the branches distended, membranous, containing a dark, granular mass. *Fructification*; elliptical *utricles* (or *spores*) furnished with a limbus, borne on the ramuli. Sphacelaria (*Lyngb.*),—from σφακελος, *gangrene*, alluding to the withered tips of the branches.

Sphacelaria *radicans*; filaments erect, or decumbent, sending out a few fibrous radicles from the lower part, sparingly branched; branches alternate, simple, very erect, straight, bare of ramuli; utricles clustered, sessile, globose.

Sphacelaria radicans, *Harv. in Hook. Br. Fl.* vol. ii. p. 324. *Harv. in Mack. Fl. Hib.* part 3. p. 181. *Harv. Man.* p. 39. *Wyatt, Alg. Danm.* no. 210.

Sphacelaria cirrhosa, ζ simplex, *Ag. Sp. Alg.* vol. ii. p. 29.

Sphacelaria olivacea, *Ag. Sp. Alg.* vol. ii. p. 30. *Harv. in Hook. Br. Fl.* vol. ii. p. 324. *Harv. in Mack. Fl. Hib.* part 3. p. 181. *Harv. Man.* p. 39. *Kütz. Phyc. Gen.* p. 292. *Endl. 3rd Suppl.* p. 24.

Conferva radicans, *Dillw. Supp.* p. 57. t. C. *E. Bot.* t. 2138.

Conferva olivacea, *Dillw. Sup.* p. 57. t. C. *E. Bot.* t. 2172. *Hook. Fl. Scot.* part 2. p. 83.

Hab. On sand-covered rocks, between tide marks. Perennial? Autumn. Rare. Bantry, *Miss Hutchins.* Dunmore, Waterford, *Miss A. Taylor.* Orkney, *Messrs. Hooker and Borrer.* Appin, *Capt. Carmichael.* Torbay, *Mrs. Griffiths.* Ilfracombe, Land's End, and Mount's Bay, *Mr. Ralfs.*

Geogr. Distr. Iceland. Baltic Sea. Heligoland, *Binder*! Coast of France, *Chauvin*!

Descr. *Root*, decumbent, irregularly branched fibres, matted together. *Filaments* capillary, from half an inch to an inch in length, erect, or decumbent, forming dense, irregular tufts spreading over the rocks in patches of various extent, seldom fastigiate; generally, owing to the unequal height of the filaments, having a ragged appearance. *Branches* few, irregular, either alternate or secund, straight, simple, very erect, destitute of ramuli, but frequently emitting root-like fibres from their lower part, articulated throughout. *Articulations* rather shorter than the diameter, longitudinally striate. *Apices* obtuse, seldom sphacelate. *Utricles*; or *spores,* abundantly produced along the sides of the upper branches, globose, scattered or clustered together, sessile, with a narrow pellucid border, and containing a dark sporaceous mass. *Colour* a dull greenish olive, preserved in drying. *Substance* rigid, rather harsh, not adhering (or but very slightly) to paper, dull, and without gloss.

A minute species, one of the least developed of the genuine members of the genus, and more remarkable for its rarity than its beauty. It was originally discovered in the neighbourhood of Bantry, by the late Miss Hutchins, and first described and figured in the appendix to Dillwyn's *Confervæ*. About the same time specimens slightly differing in character, were gathered in Orkney by Messrs. Hooker and Borrer, and received the name of *olivacea*: and thus two species have generally been recognised. A careful comparison of the characters attributed to each, with an examination of specimens from several localities, has satisfied me that the differences do not warrant the retention of two species, and I consequently here unite the *S. olivacea* of authors, to the older *S. radicans*. The form to which the name *olivacea* was given, is rather more erect, and less disposed to throw out radicles than common; but there are no other characters by which it can be distinguished. I speak of the *S. olivacea* of British authors; the plant so called by Lyngbye appears to be somewhat different, and is either a distinct species or a state of *S. cirrhosa*.

Fig. 1. Tufts of SPHACELARIA RADICANS:—*of the natural size*. 2. Filaments: —*magnified*. 3. Apex of a fertile branch:—*more highly magnified*.

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Plate CXC

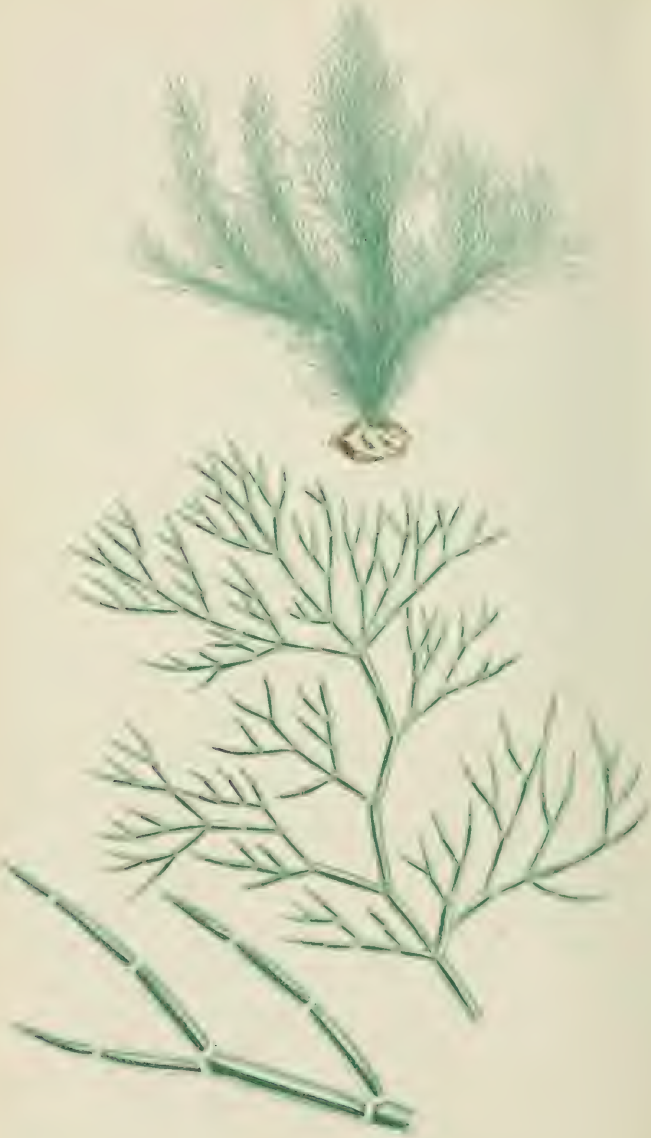

PLATE CXC.

CLADOPHORA LÆTEVIRENS, *Kütz.*

GEN. CHAR. *Filaments* green, jointed, attached, uniform, branched. *Fruit* aggregated granules or zoospores, contained in the joints, having, at some period, a proper ciliary motion. CLADOPHORA (*Kütz.*),—from *κλαδος*, a *branch*, and *φορεω*, to bear.

CLADOPHORA *lætevirens*; filaments much branched, bushy, forming tufts of a transparent, yellow-green colour, faded, and without gloss when dry; branches erecto-patent, crowded, repeatedly divided, flexuous, the lesser divisions often opposite; ultimate ramuli secund, blunt, of few articulations; articulations of the branches six times, of the ramuli thrice, as long as broad.

CLADOPHORA lætevirens, *Kütz. Phyc. Gen.* p. 267.

CLADOPHORA ægæa, *Kütz. Phyc. Gen.* p. 266 (?)

CONFERVA lætevirens, *Dillw. Conf.* t. 48. *E. Bot.* t. 1854. *Harv. Man.* p. 137. *Lyngb. Hyd. Dan.* p. 154. *Ag. Syst.* p. 107. *Harv. in Hook. Br. Fl. Hib.* part 3. p. 228. *Wyatt, Alg. Danm.* no. 143.

CONFERVA glomerata, β. marina, *Roth. Cat. Bot.* vol. iii. p. 237. *Lyngb. Hyd. Dan.* p. 154. *Ag. Syst.* p. 107. *Harv. in Hook. Br. Fl.* vol. ii. p. 357 *Harv. in Mack. Fl. Hib.* part 3. p. 228. *Wyatt, Alg. Danm.* no. 143.

HAB. On rocks, stones, and Algæ, between tide marks. Annual. Summer. Frequent on most of our rocky shores.

GEOGR. DISTR. Atlantic shores of Europe and North America.

DESCR. *Root* scutate. *Filaments* as thick as human hair, or somewhat more robust, 6–8 inches long, densely tufted, and very much branched; the main divisions somewhat zigzag, the lesser branches patent, spreading on all sides, unequal in length, set with two or more series of smaller branchlets, the last of which are frequently opposite. Ultimate *ramuli* one or two lines long, composed of three or four cells, somewhat curved, secund, obtuse, spreading. *Articulations* of the main divisions and larger branches several times longer than broad, of the ramuli about thrice as long, full of a bright endochrome, which is unequally dispersed when the plant is placed in fresh water. *Colour* a fine yellow-green, more or less discharged in drying. *Substance* membranaceous, soft, adhering, but not very firmly, to paper.

A common species on most of our rocky shores, and widely dispersed through the northern Atlantic. Forms nearly resembling it, though they may appear under different specific names, are found in most parts of the world, within temperate latitudes. It was first proposed as a distinct species by Dillwyn, who draws attention to its peculiarly pale green colour and bushy mode of growth. These characters, taken in addition to the robust threads, spreading branches, and blunt ramuli may serve to distinguish it from our other marine kinds, but it is more difficult to point out characters by which it may be known from a fresh-water species, *C. glomerata*. Almost all authors, indeed, who have written on the genus seem disposed to regard *C. lætevirens* as a marine variety of *C. glomerata*, attributing what minor differences may be seen to a difference of locality. This is the view taken by Agardh, and adopted in Hooker's British Flora. Mrs. Griffiths, however, who has paid much attention to plants of this genus, and to whose acute eye we owe the detection of more than one new form among them, is of a different opinion, and, at her instance, I have in another place restored *C. lætevirens* to the catalogue: whilst I express my doubts of the propriety of such a step. Among such imperfect plants *habitat* may, perhaps, be admitted as a character of no ordinary importance, and if we allow it in the present case, there can be no difficulty in the matter; for *C. lætevirens* is found in the open sea, beyond all influence of fresh water, and *C. glomerata* in rills and rivers remote from the sea, and often high among the hills. Practically, therefore, and as far as *collectors* are concerned, the plants may be allowed to be distinct. But when we come to speak of the physical distribution of species, it should be borne in mind that these marine and fresh-water plants are, perhaps, different states of the same thing. A similar instance of an Alga growing in the open sea and in fresh water, occurs in *Bangia fusco purpurea*, which is often found in fresh-water streams in very inland situations; but instances of such indifference in habitat are very unusual.

Fig. 1. Cladophora lætevirens:—*of the natural size.* 2. Part of a branch. 3. Ramuli:—*more or less highly magnified.*

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Plate CXCI.

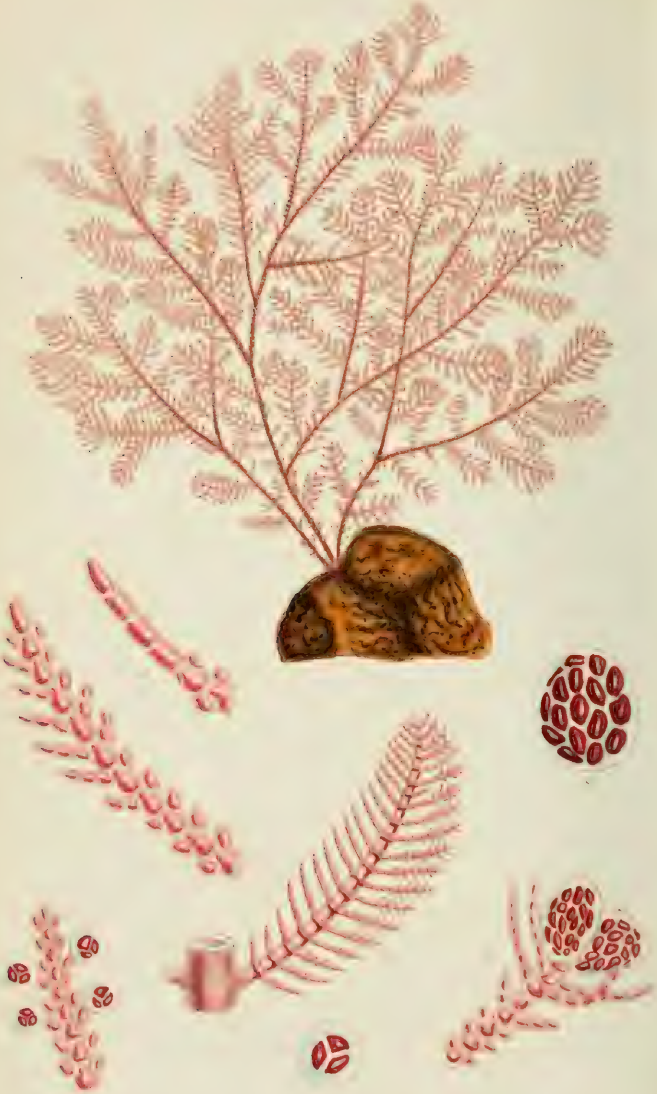

PLATE CXCI.

PTILOTA SERICEA, *Gmel. (sp.)*

GEN. CHAR. *Frond* inarticulate, linear, compressed, or flat, distichous, pectinato-pinnate; the pinnules sometimes articulate. *Fructification,* of two kinds on distinct individuals; 1, *tetraspores* attached to, or immersed in, the ultimate pinnules; 2, roundish, clustered *receptacles* (*favellæ*) surrounded by an involucre of short ramuli. PTILOTA (*Ag.*),—from πτιλωτος, *pinnated.*

PTILOTA *sericea*; frond flaccid, excessively branched; secondary branches bi-tripinnate; pinnæ and pinnules exactly opposite, the latter linear, composed of a single row of cells; tetraspores on short processes of the pinnules; favellæ pedunculate, binate, naked, or surrounded with a few irregular ramuli.

PTILOTA elegans, *Kütz. Phyc. Gen.* p. 378.

PTILOTA plumosa, var. γ. tenuissima, *Ag. Sp. Alg.* vol. i. p. 386. *Ag. Syst.* p. 195.

PTILOTA plumosa, β. capillaris, *Grev. Alg. Brit.* p. 155. *Hook. Fl. Br.* vol. ii. p. 307. *Wyatt, Alg. Danm.* no. 77. *Harv. in Mack. Fl. Hib.* part 3. p. 204. *Harv. Man.* p. 84.

FUCUS sericeus, *Gm. Hist. Fuc.* p. 149. t. 15. f. 3.

FUCUS Ptilotus, *Gunn. Fl. Norv.* vol. ii. p. 135. t. 2. f. 15. *Esper. Ic.* p. 96. t. 46.

FUCUS pectinatus, *Gunn. Fl. Norv.* vol. ii. p. 122. t. 2. f. 8. *Esper. Ic.* p. 97. t. 47.

PLOCAMIUM elegans, *Bory, sec. Kütz.*

HAB. On the perpendicular faces of rocks, between tide marks; rarely on the stems of *Fucus serratus*. Perennial. Summer and autumn. Very common on the British shores.

GEOGR. DISTR. Atlantic shores of Europe, from Norway to France. East coast of North America.

DESCR. *Root,* a small disk. *Fronds* tufted, two to four inches long, or more, and as much in expansion, distichous, excessively branched, in a more or less regularly pinnate manner, the main divisions only being somewhat dichotomous; secondary branches elongate, repeatedly and closely pinnate, the pinnæ and pinnulæ nearly horizontally patent, of very irregular lengths, short and long being intermixed consecutively without order; the longer again and again pinnated, the shorter simple. *Ultimate pinnulæ* very closely set, those on the outer side of the pinnæ longer than the inner, linear, blunt, slightly curved, articulated, composed of a single row of quadrate cells; the older ones emitting pinnules of a second order at each joint, in which case the cells of the main pinnule acquire an invertly pyriform shape (owing to the excavation of two lateral buds). *Tetraspores* spherical, with wide borders, borne on the lateral processes of the pinnules. *Favellæ* on the apices of shortened pinnæ, largish, binate, oval, containing many granules, naked, or surrounded by an imperfectly formed involucre of jointed ramuli. *Colour*, a very dark blackish, or brownish red; becoming pinky, after long exposure and steeping in fresh water. Under the microscope small portions have a clear, full lake colour. *Substance* very soft and flaccid, adhering to paper.

Under Plate LXXX. of the first volume, I stated my intentions to separate the form usually considered by British botanists as a variety of *Ptilota plumosa*, from that species, as has already been done by Kützing, and I now fulfil that promise. I am compelled, however, in deference to an earlier botanist, to adopt a different specific name from that imposed by Kützing. That our plant is really the *Fucus sericeus* of Gmelin, as well as the *F. Ptilotus* and *F. pectinatus* of Gunner, admits of scarcely a doubt. The descriptions of these authors are sufficiently full, and the figures quoted sufficiently characteristic. And I much prefer the expressive name *sericeus*, which aptly defines the soft and *silky* substance of this species, to the much more modern *elegans*, which, however applicable in the abstract, is scarcely characteristic of a plant which is probably the least elegant of the beautiful genus to which it belongs. Had I been at liberty to choose a specific name, I should certainly have proposed *rupestris* as the most characteristic.

Under *Pt. plumosa* I have already stated that our *Pt. sericea* "invariably" grows on rocks. This is using rather too strong an expression, for though it very generally does grow on rocks, it is sometimes found on several of the smaller Algæ, and therefore mere difference of habitat cannot be insisted on as one of its diagnostic characters. The true difference between *Pt. plumosa* and *Pt. sericea* must be placed in the different structure of the ramuli, these being much more simple in the present plant. Two other species, with similarly jointed ramuli, are found in the Southern Hemisphere.

Fig. 1. PTILOTA SERICEA:—*of the natural size*. 2. A plumule. 3. Young pinnule. 4. An older pinnule. 5. Part of a fertile pinnule, bearing tetraspores. 6. A tetraspore. 7. Pinnule with favellæ. 8. A favella:—*all more or less magnified*.

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Plate CXCII.

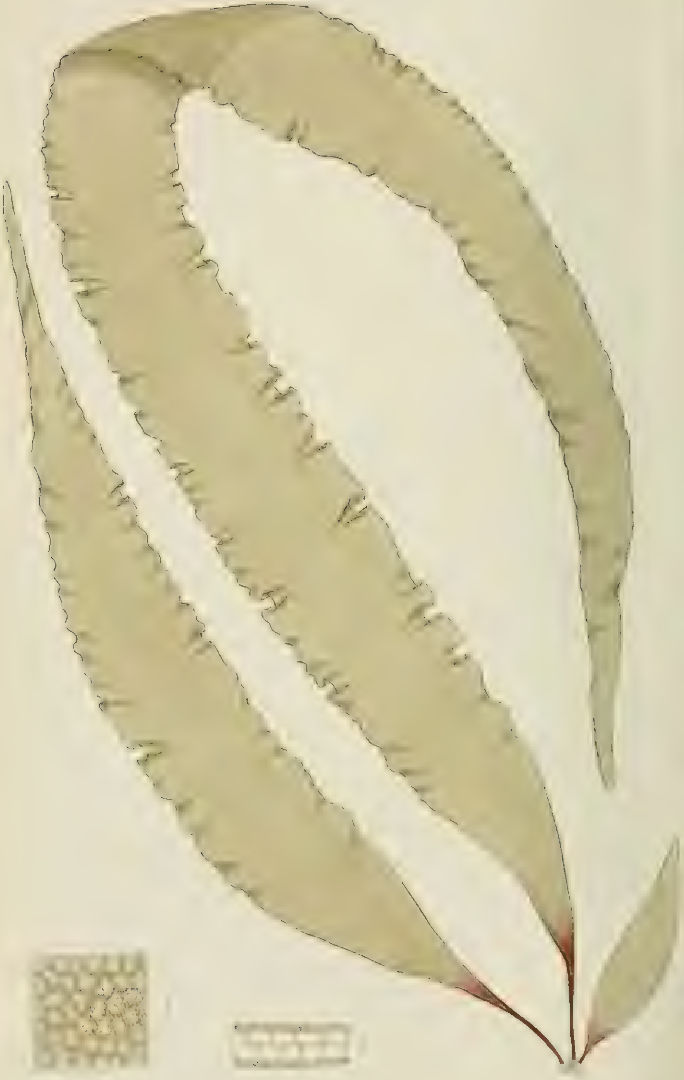

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PLATE CXCII.

LAMINARIA PHYLLITIS, *Lamour.*

GEN. CHAR. *Frond* stipitate, coriaceous, or membranaceous, flat, undivided, or irregularly cleft, ribless. *Fructification*; cloudy spots of spores, imbedded in the thickened substance of some part of the frond. LAMINARIA (*Lamour.*),—from *lamina*, a thin plate, in allusion to the flat frond.

LAMINARIA *phyllitis*; stipe short, subcompressed, gradually expanding into a linear-lanceolate, delicately membranaceous, undivided frond.

LAMINARIA phyllitis, *Lam. Ess.* p. 22. *Lyngb. Hyd. Dan.* p. 23. *Ag. Sp. Alg.* vol. i. p. 121. *Ag. Syst.* p. 273. *Spreng. Syst. Veg.* vol. iv. p. 325. *Grev. Alg. Brit.* p. 34. *Hook. Br. Fl.* vol. ii. p. 272. *Harv. in Mack. Fl. Hib.* part 3. p. 171. *Endl. 3rd Suppl.* p. 27. *Kütz. Phyc. Gen.* p. 345.

LAMINARIA saccharina (*young state*), *Hook. Fl. Scot.* part 2. p. 98.

LAMINARIA saccharina, var. attenuata, *Grev. Fl. Edin.* p. 282.

FUCUS phyllitis, *Stack. Ner. Brit.* t. 9. *Turn. Syn.* p. 193. *Turn. Hist.* t. 164. *E. Bot.* t. 1331. *Esper, Ic.* t. 149.

FUCUS phyllitidis folio, *Raii. Syn.* p. 40.

HAB. On rocks and stones, in pools left by the tide; also in four or five fathoms water. Biennial? Summer. Not uncommon. Coast of Dorsetshire, *Pulteney.* Portland Head and Tenby, *Stackhouse.* Sidmouth and Torquay, *Mrs. Griffiths.* Yarmouth, *Mr. Wigg.* Coast of Sussex, *Mr. Borrer.* Orkney, *Rev. J. H. Pollexfen* and *Dr. Mc'Bain.* Frith of Forth and Staffa, *Dr. Greville.* Ardrossan, *Rev. D. Landsborough.* Larne, *Mr. Templeton.* Bantry Bay, *Miss Hutchins.* Howth and Balbriggan, *Miss Gower.* Kingstown, *Mr. T. N. Cole.*

GEOGR. DISTR. Atlantic shores of Europe, from Norway to France.

DESCR. *Root* consisting of thick, branching, and clasping fibres. *Stem*, an inch or two in length, slender, cylindrical below, becoming compressed upwards, and gradually widening into the much attenuated base of a linear lanceolate frond. *Frond* from six or eight inches "to three or more feet in length, and one to six inches in width," (*Grev.*) delicately membranaceous, flat, or slightly waved at the margin, undivided, tapering much, and gradually to each extremity. *Fructification*, I have not seen. *Substance* thin, but tough, glossy, and more or less perfectly adhering to paper. The frond is traversed internally by a double stratum of large air-cells, whose walls, as well as the surfaces of the frond, are composed of minute cellules. *Colour*, when quite fresh, a clear, brown-olive, soon changing in fresh water to green, which is also the colour of dried specimens.

This plant has been observed by botanists from a very early period, and almost invariably kept distinct from *L. saccharina*, its nearest ally, by every author who has written on the subject of Phycology. Dr. Greville, who at one time united it with *L. saccharina*, has, in his last work, restored it to a place in the system, remarking:—"I cannot but express some doubt regarding the claim of this beautiful Alga to be considered as distinct from the preceding species (*L. saccharina*). The more I have studied it in a growing state, the less am I tempted to speak positively on the subject. Upon the whole, however, I am rather inclined to think it a true species. Having traced it from its earliest appearance to its full size, I can testify that its characters are preserved in every stage." I believe that most observers have, at one time or other, shared in the doubts thus expressed by Dr. Greville, and many may be disposed to go further and reject *L. phyllitis* from the list altogether. Among these I must mention Mrs. Griffiths, who has repeatedly stated to me her opinion that no good marks exist between *L. phyllitis* and *saccharina*, but that the former is merely the young of the latter. In adopting a contrary view, I have not acted hastily or without comparing specimens of the young of both plants. Very recently my friend Mr. Cole has laid before me a series of specimens of both, tracing the growth of *L. saccharina* upwards, from the height of half an inch to a full development, and a similar set of young plants of *L. phyllitis*. And I must admit that, though there is a close resemblance, there is a clear distinction at all ages between living plants: *L. saccharina* being thicker, of darker colour, and with a more abrupt base than *L. phyllitis*, whose delicately membranous nature, and strictly lanceolate form, are preserved to a very large size, The latter also very rapidly changes colour in fresh water, while the former may be preserved for some hours in that medium.

Having said so much, I submit the matter to the investigation of my fellow-students, and shall be glad to be favoured with an expression of their opinions.

Fig. 1. LAMINARIA PHYLLITIS; small specimens:—*of the natural size.* 2. Portion of the surface. 3. Section of the frond:—*both highly magnified.*

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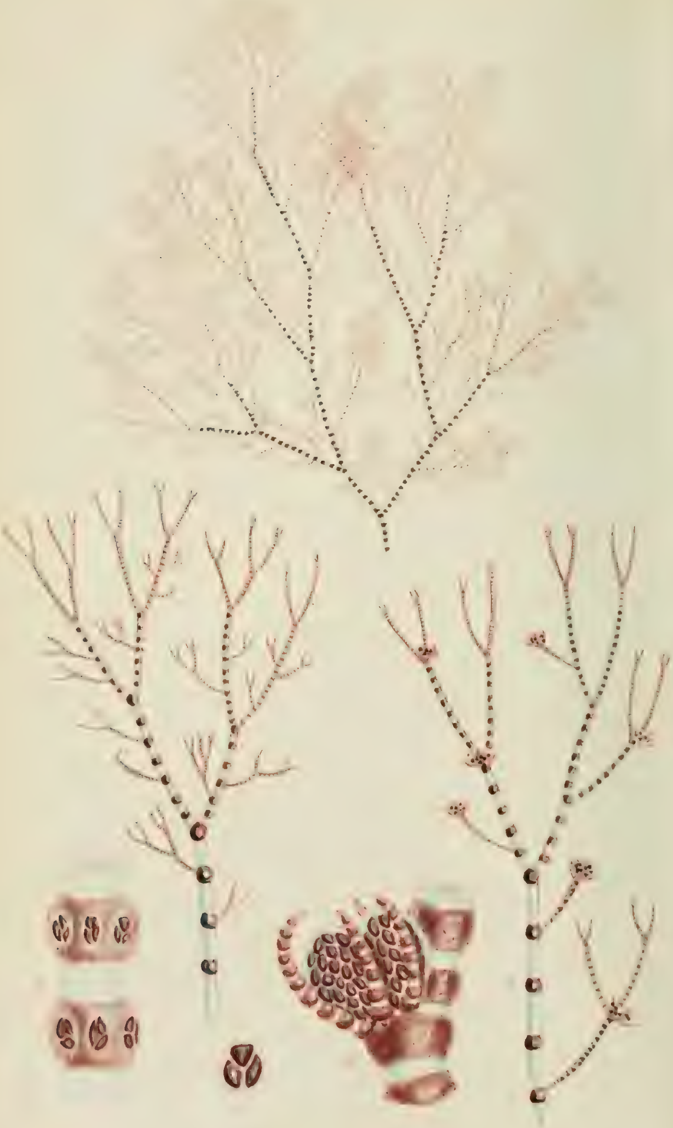

PLATE CXCIII.

CERAMIUM DIAPHANUM, *Roth.*

GEN. CHAR. *Frond* filiform, one-tubed, articulated; the dissepiments coated with a stratum of coloured cellules, which sometimes extend over the surface of the articulation. *Fructification* of two kinds on distinct individuals; 1, *tetraspores* either immersed in the ramuli or more or less external; 2, sessile, roundish *receptacles* (*favellæ*), having a pellucid limbus, containing minute, angular spores, and subtended by one or more, short, involucral ramuli. CERAMIUM (*Roth.*),—from *κεραμος*, a *pitcher*; but the fruit is not pitcher-shaped.

CERAMIUM *diaphanum*; filaments setaceous, attenuated upwards, rather flaccid, irregularly dichotomous, the lower forkings distant, the upper close together; branches set with short, lateral, dichotomous ramuli; articulations colourless, those of the main stems three or four times as long as broad, of the ramuli short; dissepiments swollen, opake; apices hooked inwards; tetraspores whorled in the joints, depressed; favellæ in the ultimate forkings of the branches, or on lateral ramuli, involucrate.

CERAMIUM diaphanum, *Roth, Cat. Bot.* vol. iii. p. 154. *Ag. Syn.* p. 61. *Hook. Fl. Scot.* part 2. p. 85. *Ag. Syst.* p. 133. *Ag. Sp. Alg.* vol. ii. p. 150. *Grev. Fl. Edin.* p. 310. *Harv. in Hook. Br. Fl.* vol. ii. p. 336. *Wyatt, Alg. Danm.* no. 87. *Harv. in Mack. Fl. Hib.* part 3. p. 210. *Harv. Man.* p. 99. *J. Ag. Alg. Medit.* p. 81. *Endl. 3rd Suppl.* p. 27.

HORMOCERAS diaphanum. *Kg. Phyc. Gen.* p. 378. *Kg. Linn.* xv. p. 733.

CONFERVA diaphana, *Lightf. Fl. Scot.* p. 996. *Fl. Dan.* t. 951. *Roth. Fl. Germ.* p. 525, *and Cat.* vol. ii. p. 226. *Dillw. Conf.* t. 38. *E. Bot. t.* 1742. *With.* vol. iv. p. 139.

CONFERVA nodulosa, *Huds. Fl. Ang.* p. 600.

BORYNA diaphana, *Grat. Dict. Class.* t. 11. *Bory, Morèe.* p. 77. no. 1797.

HAB. Parasitical on several of the smaller Algæ in rock-basins, between tide marks; sometimes growing on rocks. Annual. Summer. Not uncommon on the British coasts from Orkney to Cornwall.

GEOGR. DISTR. Dispersed throughout the temperate parts of the Atlantic and Pacific Oceans. (The various localities given require re-examination, as several species are commonly confounded by authors under the name *diaphanum*.) Mediterranean and Black Seas, *Ag.*

DESCR. *Root* minute, discoid. *Fronds*, three to six or eight inches long, not very densely tufted, setaceous at base, gradually attenuated upwards to a capillary fineness, more or less regularly dichotomous, or flabellately branched. sometimes alternately divided with an evident main-stem; the branches naked, or set with slender, forked, or several times dichotomous, short ramuli, one to three lines in length. Apices hooked in. Lower axils distant, spreading; upper gradually closer and more erect. *Articulations* pellucid, those of the main branches four or five times longer than broad; of the upper branches gradually shorter; of the ramuli exceedingly short; all deeply coloured at the swollen joints. *Tetraspores* immersed in the joint, several in each, disposed in a whorl. *Favellæ* surrounded by an involucre of several (4-5) short incurved ramuli, either sessile in the upper forks or borne on lateral peduncles. *Substance* soft, but rather firm; glossy when dry, and adhering pretty firmly to paper. *Colour*, a brownish-red, with a purplish tinge; sometimes more clearly purple.

Our figure is intended to represent the *typical* form of the old *Conferva diaphana* of British authors, the longest known of the extensive group of the genus to which it belongs; a group which contains numerous very distinct plants, which were once confounded together as varieties of the species now under review. From the British species of this section, except one, our *C. diaphanum* may be at once known by its larger size and more robust filaments; it is also well characterized by the lateral dichotomous ramuli given off all along the principal divisions of the frond, and by the gradually attenuated filaments. These last characters distinguish it from *C. nodosum* and *C. fastigiatum*.

Limited as it now is, the species has a very wide range, being found in most of the temperate parts of the sea. Though existing on all our coasts, from north to south, it does not appear to be very abundant anywhere, seldom growing in society: the tufts being thinly scattered here and there through the rock-pools. When growing, few Algæ are more delicately beautiful; and even in a dry state it forms a very handsome object, the brilliancy and regularity of the dot-like joints, connected by hyaline, glistering spaces, having the effect of a piece of fine tracery.

Fig. 1. CERAMIUM DIAPHANUM:—*of the natural size*. 2. Branch, with tetraspores. 3. Joints from the same. 4. A tetraspore. 5. Branch with favellæ. 6. Joints from the same, with involucrated favellæ:—*all more or less highly magnified*.

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Plat. CXCIV.

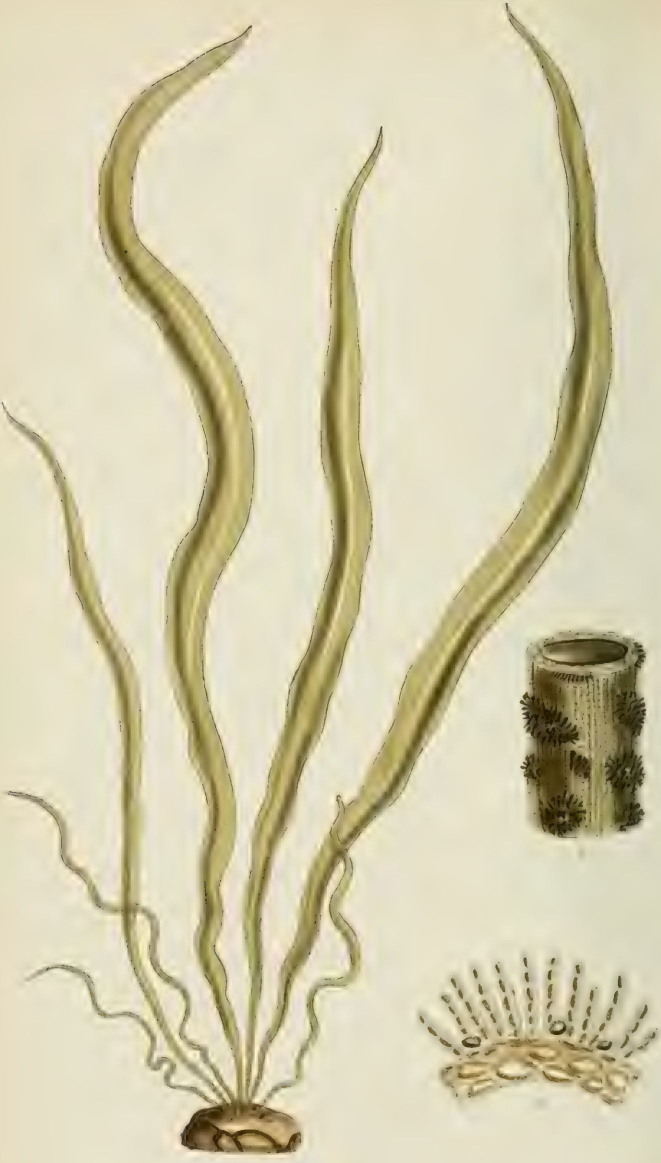

PLATE CXCIV.

ASPEROCOCCUS ECHINATUS, *Grev.*

GEN. CHAR. *Frond* unbranched, tubular, cylindrical, or rarely compressed, continuous, membranaceous. *Fructification* scattered over the whole frond, in minute, distinct *dots* (*sori*) composed of roundish, prominent spores, mixed with club-shaped filaments. ASPEROCOCCUS (*Lamour.*), corruptly formed from *asper, rough,* and κοκκος, a *fruit* or *seed.*

ASPEROCOCCUS *echinatus;* frond cylindrical, obtuse, or acute, much and gradually attenuated to the base.

ASPEROCOCCUS echinatus, *Grev. Alg. Brit.* p. 50. t. 9. *Harv. Man.* p. 35. *Endl. 3rd Suppl.* p. 26.

ASPEROCOCCUS fistulosus, *Hook. Br. Fl.* vol. ii. p. 277. *Wyatt, Alg. Danm.* no. 7. *Harv. in Mack. Fl. Hib.* part 3. p. 175.

ASPEROCOCCUS rugosus, *Lamour. Ess.* p. 62.

ENCŒLIUM echinatum, *Ag. Sp. Alg.* vol. i. p. 145. *Ag. Syst.* p. 261. *Spreng. Syst. Veg.* vol. iv. p. 328. *Kütz. Phyc. Gen.* p. 336.

ENCŒLIUM Lyngbyanum, *Grev. Crypt.* t. 290.

SCYTOSIPHON fistulosus, *Lyngb. Hyd. Dan.* p. 66.

SCYTOSIPHON filum, var. fistulosum, *Ag. Sp.* vol. i. p. 163. *Ag. Syst.* p. 258.

ULVA fistulosa, *Huds. Fl. Ang.* p. 569. *E. Bot.* t. 642. *Hook. Fl. Scot.* part 2. p. 92.

CONFERVA fistula, *Roth, Cat. Bot.* vol. iii. p. 169.

Var. β. frond setaceous, filiform, twisted.

ASPEROCOCCUS echinatus, β. vermicularis, *Harv. Man.* p. 35.

ASPEROCOCCUS vermicularis, *Moore, Ord. Surv. Londonderry, Bot.* p. 9. *Wyatt, Alg. Danm.* no. 207.

HAB. On stones, &c., between tide marks. Annual. Summer and autumn. Common on the British shores.

GEOGR. DISTR. Atlantic coasts of Europe and America. Southern Ocean, at Lord Auckland's Islands, *Dr. Hooker.*

DESCR. *Root,* a small disc. *Fronds* densely tufted, from twenty to a hundred growing from nearly the same point, varying from two inches to two feet in length, and from half a line to half an inch in diameter, very much and very gradually attenuated at the base, and more or less tapering upwards, sometimes ending abruptly in a blunt point, sometimes acute, and much drawn out, cylindrical, bag-like, here and there irregularly somewhat narrowed, or slightly constricted. *Fructification* densely sprinkled over the whole frond, forming minute, prominent, rough dots, composed of densely packed, vertical filaments, among which the spores are concealed. In a young state the frond is clothed with long, pellucid fibres. *Substance* membranaceous, soft; when young, slimy, adhering to paper. *Structure* reticulated, the membrane composed of large, lax cells. *Colour* olive, more or less brown; when young greenish. β. differs in being much more slender, and generally is a parasite on other small Algæ.

A very common, but we cannot say a very beautiful plant; one of the least highly organized of the family to which it belongs, and the coarsest in its mode of growth. The only variation to which it is subject is the size, and the more or less tapering extremities. The size varies so greatly that very good observers have contended for two species, the smaller one of which we retain as a variety, although it passes so insensibly into the larger form that no distinct limits can be assigned between them. From *A. Turneri* (Pl. XI.) this is at once distinguished by the thicker substance, darker colour, tapering base, and by being only moderately inflated. The former species is also remarkable for the bluntness of its frond. The present more nearly resembles *A. compressus*, (Pl. LXXII.), some ill-coloured and narrow examples of which have very much the outline and general aspect of *A. echinatus*, and can scarcely be known from it except by the character of compression: a character whose distinctness is greatly lost in the dry state.

Other specimens frequently are met with which resemble *Chorda lomentaria*, even to the extent of being here and there constricted. The fructification affords the best mark of distinction from puzzling forms of the latter.

Fig. 1. Asperococcus echinatus; fronds:—*of the natural size*. 2. Portion of the tube, with *sori*:—*magnified*. 3. Section of the membrane and sorus:—*highly magnified*.

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Plate CXCI

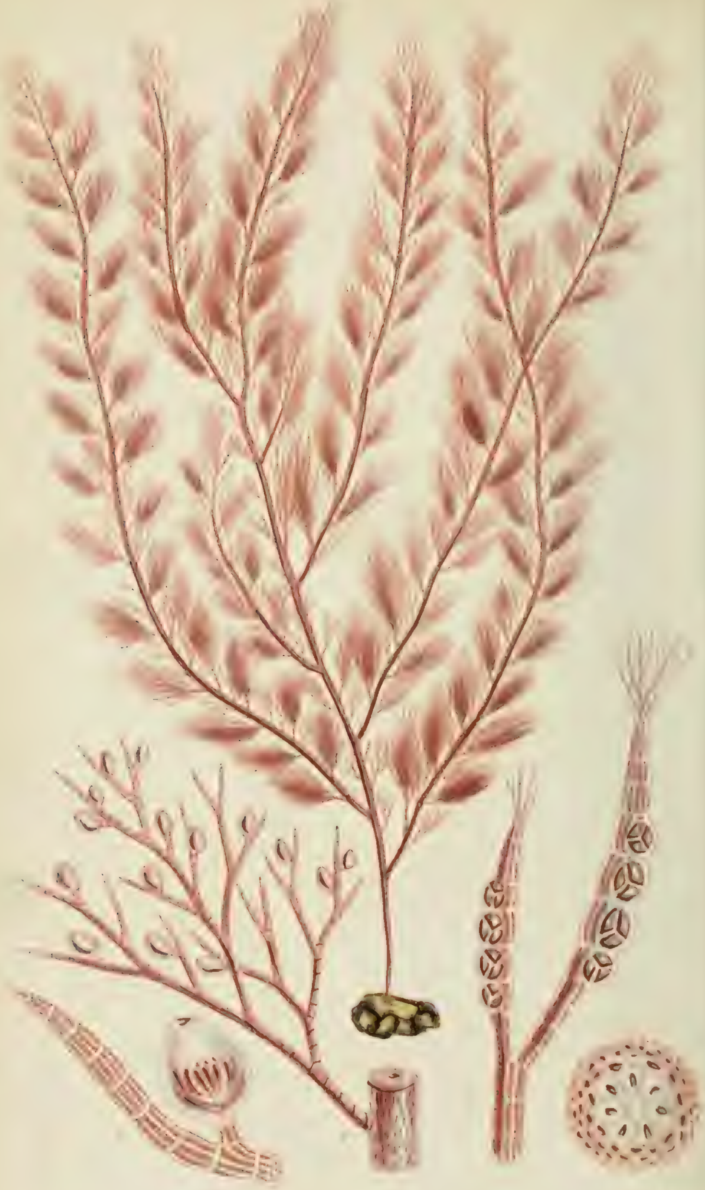

PLATE CXCV.

POLYSIPHONIA BRODIÆI, *Grev.*

GEN. CHAR. *Frond* filamentous, partially or generally articulate; the joints longitudinally striate, composed of numerous radiating cells or tubes disposed round a central cavity. *Fructification* two-fold on different individuals; 1, ovate *capsules* (*ceramidia*) furnished with a terminal pore, and containing a tuft of pear-shaped spores; 2, *tetraspores* imbedded in swollen branchlets. POLYSIPHONIA (*Grev.*),—from πολυς, *many*, and σιφων, a *tube*.

POLYSIPHONIA *Brodiæi*; stems inarticulate, robust, cartilaginous, alternately branched; branches virgate, clothed with spreading, pencilled, multifid, delicate, flaccid ramuli ; articulations of the ramuli three or four tubed, rather longer than broad; siphons in the stem about seven, surrounding a narrow cavity; capsules ovate, pedicellate, or subsessile; tetraspores in the swollen tips of the multifid ramuli.

POLYSIPHONIA Brodiæi, *Grev.—Harv. in Hook. Br. Fl.* vol. ii. p. 328. *Harv. in Mack. Fl. Hib.* part 3. p. 206. *Wyatt, Alg. Danm.* no. 83. *Harv. Man.* p. 91. *Endl. 3rd Suppl.* p. 45. *Kütz. Phyc. Gen.* p. 427.

HUTCHINSIA Brodiæi, *Lyngb. Hyd. Dan.* p. 109. t. 33. *Hook. Fl. Scot.* part 2. p. 88. *Ag. Syst.* p. 154. *Ag. Sp. Alg.* vol. ii. p. 63.

HUTCHINSIA penicillata, *Ag. Sp. Alg.* vol. ii. p. 65.

CONFERVA Brodiæi, *Dillw. Conf.* t. 107. *E. Bot.* t. 2589.

CERAMIUM Brodiæi, *Ag. Disp.* p. 20.

HAB. On rocks and corallines near low-water mark. Annual. Summer. Common on the rocky shores of Scotland; of the south of England, and south and west of Ireland. Channel Islands.

GEOGR. DISTR. Atlantic shores of Europe, as far south as France; and of North America. Fœroe Islands.

DESCR. *Root* a conical disc. *Fronds* from six to twelve inches long or more, as thick as small twine at the base, gradually attenuated upwards, generally furnished with a more or less evident main stem divided into several long, simple branches, of a linear-lanceolate outline. Sometimes the branches spring from nearly the same points; at other times they are disposed alternately along a lengthened stem, when the frond assumes a pinnate character. *Branches* long and simple, inarticulate like the stem, quadrifarious, and clothed more or less densely with short, flaccid, and slender quadrifarious ramuli, about half an inch in length. *Ramuli* multifid, irregularly dichotomous, pencilled, articulated. *Articulations* of the ramuli rather longer than broad, marked with three or four tubes; dissepiments hyaline. *Stem* opake, traversed by about seven primary siphons, surrounded by as many secondary ones, and with a wide stratum of smaller cells. *Capsules* ovate, abundantly produced on the multifid ramuli, mostly pedicellate. *Tetraspores* in swollen ramuli. *Colour* a dark brown, with more or less of a purplish shade. *Substance* very soft, in some instances gelatinous, and soon decomposing in fresh water. *Smell* very disagreeable.

This is one of the handsomest, as it is one of the largest of the British species of *Polysiphonia*, and easily recognised, except occasionally from some specimens of *P. fruticulosa*, by its peculiar habit. The inarticulate stem, and long, simple, robust branches clothed with pencils of delicate filaments strongly mark the species. Common as it is now ascertained to be on many of our shores, as well as on those of northern Europe and the eastern shores of North America, it remained unnoticed by botanists until it was observed about forty years ago, by the late Mr. Brodie, of Brodie, to whose honour Mr. Dillwyn has dedicated it.

The figure originally given in Dillwyn's Confervæ is very characteristic of a common form of the plant; and so also, as it appears to me, is that given by Lyngbye, which latter, nevertheless, is held by the elder Agardh to represent a distinct species, which he calls *P. penicillata*. Except in the greater simplicity of ramification, this last perfectly agrees with the common form; and I confess myself unable to draw any distinct line, even sufficient to mark a *variety*, between it and the plant represented in our plate. It would be easy to find, in the large suite of specimens from which I have had to select, several forms distinguished by minor peculiarities of branching, which nevertheless agree in the aggregate of characters; and if *P. penicillata* be admitted to rank as a species, we must be prepared to divide the species still more; but, I think, to little purpose.

Fig. 1. POLYSIPHONIA BRODIÆI:—*of the natural size*. 2. Multifid ramulus, with capsules. 3. Apex of the same, with a capsule. 4. Apex of a ramulus with tetraspores. 5. Transverse section of the stem.

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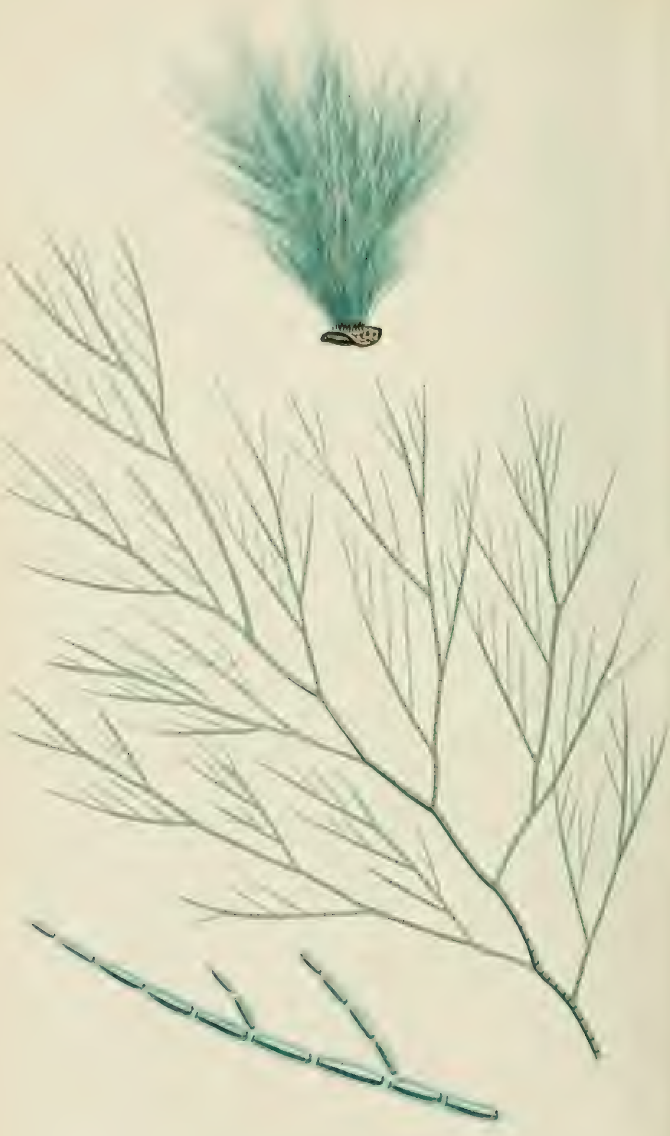

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PLATE CXCVI.

CLADOPHORA GLAUCESCENS, *Griff.*

GEN. CHAR. *Filaments* green, jointed, uniform, branched. *Fruit*, aggregated granules or zoospores, contained in the joints, having, at some period, a proper ciliary motion. CLADOPHORA (*Kütz.*), — from κλαδος, a *branch*, and φορεω, to bear.

CLADOPHORA *glaucescens*; tufts dense, glaucous-green, subfastigiate; filaments very slender, flexuous, excessively branched; branches rather straight, erect, or erecto-patent, the lesser ones furnished with close, very erect, straight, elongated ramuli; articulations nearly uniform, about thrice as long as broad.

CONFERVA glaucescens, *Griff. in Wyatt, Alg. Danm.* no. 195. *Harv. Man.* p. 139.

HAB. On rocks and stones, between tide marks. Annual. Summer. Not uncommon. Torquay, *Mrs. Wyatt.* Falmouth Bay, *Miss Warren.* Mounts Bay, *Mr. Ralfs.* Mangan's Bay, *Miss Ball.* Portmarnock, *Mr. Moore.* Coast of Down, *Mr. W. Thompson.* Rocks beyond Kingstown Harbour, abundant in May, *W. H. H.*

GEOGR. DISTR. British Islands.

DESCR. *Root*, a small callus. *Filaments* very slender, densely tufted, two to four inches long, sometimes forming circumscribed tufts, sometimes more unequally distributed, excessively branched; the principal branches variously curved or irregularly bent, the lesser ones more and more straight and erect, alternate, or secund, very rarely opposite, repeatedly divided. *Ultimate* ramuli usually elongated, consisting of several cells, secund, erect, close together. *Articulations* uniform in all parts of the frond, about thrice as long as broad, filled with a pale green, not very dense endochrome, which is more or less dissipated in drying. *Substance* membranaceous, rather soft, but not flaccid, adhering, but not very closely, to paper in drying. When dry, the colour is sometimes a pale green, sometimes darker; and the filaments preserve a slight gloss.

This is one of the many beautiful plants for whose correct determination the Phycologist is indebted to the accurate eye and discriminating judgment of Mrs. Griffiths, who first published it in Mrs. Wyatt's excellent Fasciculi of Devonshire Algæ. It is difficult to say to which of the British species of *Cladophora* it is most closely allied. At one time I regarded it as belonging to the same group as *C. arcta*, and even thought that it might prove to be merely a state of that species: but a more careful examination and comparison show a greater affinity with *C. albida* or *C. refracta*, from either of which, however, it is readily known by a difference in ramification. Its peculiarly glaucous colour when fresh, joined to the slenderness of the filaments, and the uniform length of the articulations in all parts of the stem, are characters by which it may most easily be known. To avoid mistakes, I have drawn the magnified portions (fig. 2 and 3) from part of one of the original specimens published in the Algæ Danmonienses. It sometimes grows to a much larger size than is represented at fig. 1.

I am not aware that this species has yet been noticed beyond the range of Britain; but the various forms of this puzzling genus are so imperfectly deciphered, that it is quite possible that it may be found under some other name, among the long lists of species published by various Continental authors. But this is a point which can scarcely be settled without a careful comparison of authentic specimens in various states. Meanwhile, I trust the figure and description now given will serve to make the characters of our *C. glaucescens* more generally known to botanists out of England.

Fig. 1. Cladophora glaucescens:—*of the natural size.* 2. Part of a branch. 3. Ramuli:—*more or less highly magnified.*

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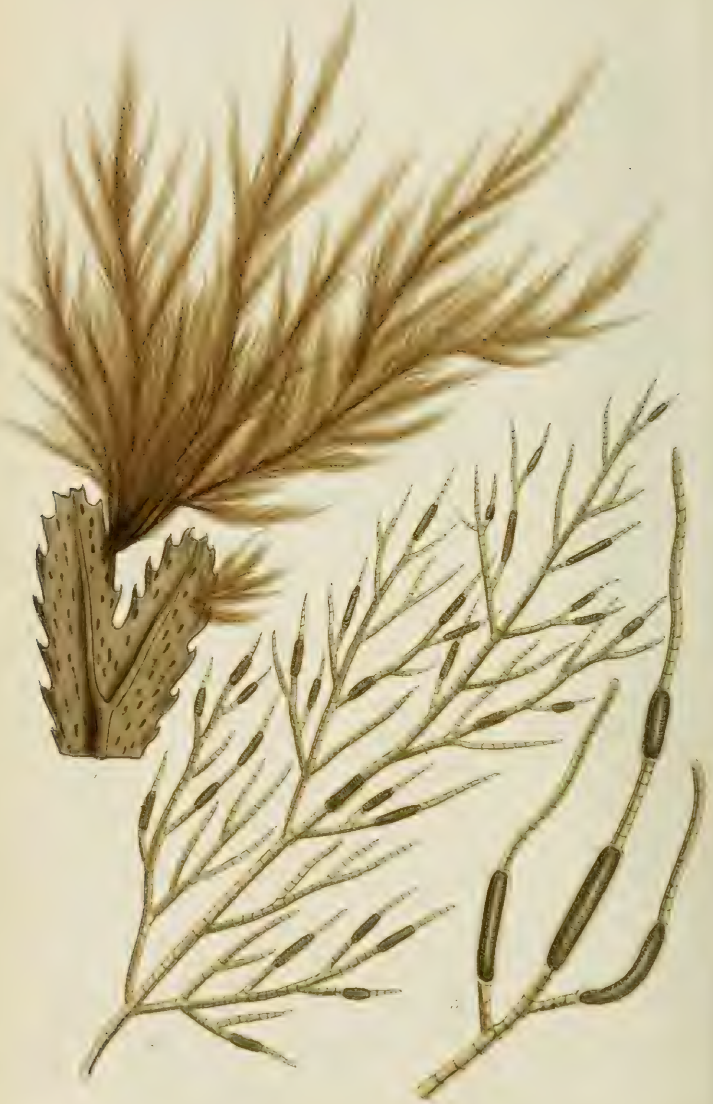
Plate CXCVII.



Reeve Benham & Reeve imp

PLATE CXCVII.

ECTOCARPUS LITORALIS, *Lyngb.*

GEN. CHAR. *Frond* capillary, jointed, olive or brown, flaccid, single-tubed. *Fruit* either spherical, elliptical, or lanceolate *utricles* (or *spores*) borne on the ramuli, or imbedded in their substance. ECTOCARPUS (*Lyngb.*),—from *εκτος, external,* and *καρπος, fruit.*

ECTOCARPUS *litoralis;* tufts dense, interwoven, olive-brown or foxy; filaments coarse, much and irregularly branched, the ultimate branchlets patent, alternate, or rarely opposite; masses of fructification imbedded in the substance of the branches, in the form of oblong swellings.

ECTOCARPUS litoralis, *Lyngb. Hyd. Dan.* p. 130. t. 42. (excl. var. β.) *Ag. Sp. Alg.* vol. ii. p. 40. *Harv. in Hook. Br. Fl.* vol. ii. p. 325. *Harv. in Mack. Fl. Hib.* part 3. p. 181. *Harv. Man.* p. 40. *Wyatt, Alg. Danm.* no. 129. *Kütz. Phyc. Gen.* p. 289. *Endl. 3rd Suppl.* p. 21.

ECTOCARPUS compactus, *Ag. Sp. Alg.* vol. ii. p. 41.

ECTOCARPUS ferrugineus, *Ag. Syst.* p. 163. *Ag. Sp. Alg.* vol. ii. p. 43. *Kütz. Phyc. Gen.* p. 289 (?)

CONFERVA litoralis, *Linn. Sp. Pl.* p. 1634. *Huds. Fl. Ang.* p. 594. *Lightf. Fl. Scot.* p. 979. *With. Br. Ar.* vol. iv. p. 130. *Roth, Cat. Bot.* vol. i. p. 152. *Dillw. Conf.* t. 31. *E. Bot.* t. 2290.

HAB. Parasitical on *Fuci* and *Laminariæ,* within and beyond the influence of the tide. Annual? At all seasons. Very common on the British shores.

GEOGR. DISTR. Abundant throughout the Northern and Atlantic Oceans.

DESCR. *Filaments* from six to twelve inches long, densely tufted, coarse, excessively branched, and often bundled together and matted into inextricable fascicles. *Branches* spreading, very irregularly inserted, usually alternate or scattered, sometimes, especially the smaller ones, opposite, repeatedly divided, of unequal length and composition. *Ramuli* scattered, or somewhat fascicled, usually alternate, erecto-patent, filiform, slightly tapering. *Articulations* about as long as broad, or a little longer. Masses of *fructification* formed at intervals in the substance of the smaller branches and ramuli, oblong, more or less elongated, consisting of swellings, twice the diameter of the filament, dark-coloured, and transversely striate. *Colour* when young, a greenish olive, becoming more and more brown, and even foxy, or reddish in old age. *Substance* soft, but not gelatinous, closely adhering to paper in drying, and not recovering well on re-immersion.

One of the commonest of the British Algæ, and widely dispersed along the shores of the ocean of most temperate countries, its specific name *litoralis* is peculiarly applicable. Nor is this shore plant at all particular in choosing the substances to which it adheres, or the depth of water where it vegetates. It equally infests the *Fuci*, which grow between tide-marks, covering with a shaggy brown fleece those that occur near high-water mark, and those that prefer a deeper level; and the *Laminariæ* that are never exposed to the air. It thus extends nearly throughout the whole belt occupied by sea plants. Nor is it confined to open sea shores; it frequents estuaries, and ascends tidal rivers for a considerable distance, growing either on *Fucus vesiculosus* or on submerged wood-work, and even on mud. Towards the close of the summer the tufts become detached, and float about in large masses, and at length are stranded in broad belts along the coast. On these, decaying under the atmosphere, Captain Carmichael first detected the curious *Sphærozyga Carmichaelii* already figured in our first volume. (Pl. CXIII.)

I have no hesitation in uniting the *E. compactus* and *E. ferrugineus* of Continental authors, with our *E. litoralis*. The characters attributed to those forms depend on age, and are gradually assumed as the plant passes its maturity and tends to decay. In the first stage of its decline it frequently becomes much matted into ropy strings, and thus becomes *E. compactus*; and eventually assumes a rusty colour, and becomes *E. ferrugineus*.

Fig. 1. Tuft of Ectocarpus litoralis growing on a fragment of *Fucus serratus*:—*of the natural size*. 2. Part of a fertile branch. 3. Ramuli from the same:—*both magnified in different degrees.*

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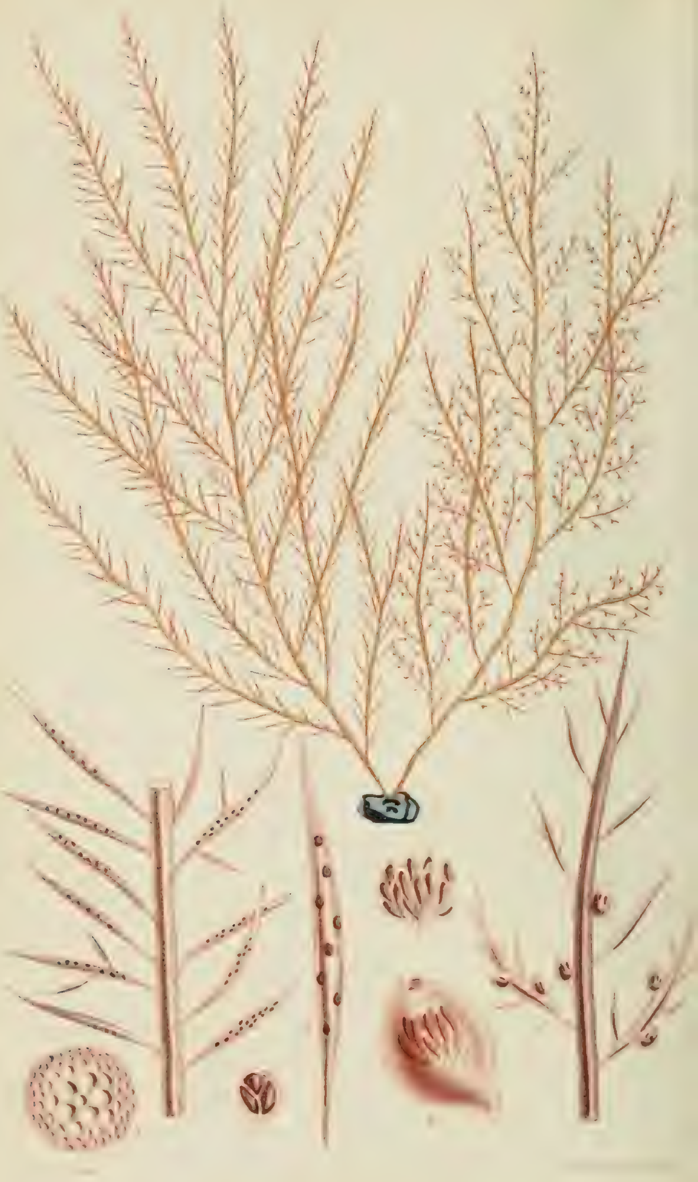

PLATE CXCVIII.

LAURENCIA TENUISSIMA, *Grev.*

GEN. CHAR. *Frond* cylindrical or compressed, linear, pinnately branched, the apices obtuse; structure cellular, solid. *Fructification* of two kinds, on distinct individuals; 1, ovate *capsules* (*ceramidia*), furnished with a terminal pore, containing a tuft of pear-shaped spores; 2, triparted *tetraspores*, imbedded in the ramuli. LAURENCIA (*Lamour.*), —in honour of M. de la Laurencie, a French naturalist.

LAURENCIA *tenuissima*; frond filiform, terete, irregularly divided; branches long and virgate, clothed with very slender, setaceous ramuli, which taper to the base and apex.

LAURENCIA tenuissima, *Grev. Alg. Brit.* p. 113. *Hook. Br. Fl.* vol. ii. p. 296. *Wyatt, Alg. Danm.* no. 22. *Harv. Man.* p. 70. *Harv. in Hook. Lond. Journ. Bot.* vol. vi. p. 401. *Endl. 3rd Suppl.* p. 43. *J. Ag. Alg. Medit.* p. 113. *Harv. in Mack. Fl. Hib.* part 3. p. 198.

ALSIDIUM tenuissimum, *Kütz. Phyc. Gen.* p. 434. t. 55. f. 1.

CHONDRIA tenuissima, *Ag. Sp. Alg.* vol. i. p. 352. *Ag. Syst.* p. 205. *Spreng. Syst. Veg.* vol. iv. p. 340.

GIGARTINA tenuissima, *Lamour. Ess.* p. 48.

FUCUS tenuissimus, *Good. and Woodw. Linn. Trans.* vol. iii. p. 215. t. 9. *Turn. Syn.* p. 35. *Turn. Hist.* t. 100. *E. Bot.* t. 1882.

HAB. On rocks and stones between tide marks; generally in shallow pools, about half-tide level. Annual. Summer. Very rare. Weymouth, *Goodenough* and *Woodward.* Isle of Wight, *Rev. G. R. Leathes.* Torbay, *Mrs. Griffiths.* Bovisand, *Rev. W. S. Hore.* Ballycotton, Co. Cork, *Miss Ball.* Jersey, *Miss White* and *Miss Turner.*

GEOGR. DISTR. Atlantic coasts of France and Spain. Mediterranean and Black Seas. East coast of North America. Tasmania.

DESCR. *Root* accompanied by interwoven fibres. *Fronds* densely tufted, from six to eight or ten inches long, half a line in diameter below, attenuated upwards. *Stem* either simple or divided into four or five principal portions, each of which is furnished with closely-set, slender, alternate, virgate, erecto-patent, undivided branches, which sometimes bear a second set of similar, but smaller branches; the whole frond, or its principal divisions having a pyramidal outline. *Branches* slender, tapering to the base and apex, more or less densely clothed with setaceous ramuli. *Ramuli* simple, two to four lines long, straight, or somewhat curved at base, and tapering to the apex, quadrifarious, irregularly inserted, either scattered or rarely somewhat fascicled. Occasionally, in luxuriant specimens, the ramuli bear a few of a second order. *Capsules* ovate, subsessile, borne profusely on the sides of the ramuli, containing a tuft of pear-shaped spores. *Tetraspores* contained in the ramuli, globose, scattered. A transverse section of the stem shows six cells of large size surrounding the central one, with a wide border of smaller cells. *Substance* between cartilaginous and gelatinous, tender, closely adhering to paper, with a slight gloss, when dry. *Colour* when growing in the shade, a pale pinkish-purple, soon fading, on exposure to sunshine, to a yellowish or greenish hue.

This is by much the most slender and delicate, as it is also the rarest, of the British species of *Laurencia*. Hitherto it has only been found on the most southern shores of England and Ireland, and this is probably the northern range of the species, as it is not known on the continent of Europe, to the north of France; and the American specimens which have reached me are chiefly from the coasts of Carolina and Florida. In Europe it is most abundant in the Mediterranean Sea. Several stations are noticed on the south coast of England, and wherever it grows it is generally found in tolerable abundance, forming dense tufts, many of which will often be found in the same pool. The favourite locality is in very shallow tide pools, fully exposed to the sun, and frequently situated but a short distance below high-water mark: thus clearly showing a partiality for warmth which marks the straggler from warmer latitudes. In such situations it frequently becomes much discoloured, the purple hue, which is natural to it, being exchanged for a greenish-yellow, at the same time that the cellular substance is much softened.

I have received fine specimens from the shores of Tasmania, where it appears to be not uncommon.

By Professor Kützing this species is referred to the genus *Alsidium*, one of the *Rhodomeleæ*; but I think few persons who have carefully studied the species of *Laurencia* in a living state can doubt its close affinity with the other individuals of that group. Indeed some specimens of *L. dasyphylla* approach it so nearly that it requires a pretty close examination to distinguish them from strong-growing individuals of *L. tenuissima*. The *L. striolata* of the Mediterranean seems scarcely distinct.

Fig. 1. Laurencia tenuissima :—*of the natural size*. 2. Portion of a branch, with tetraspores in the ramuli. 3. Fertile ramulus. 4. Tetraspores from the same. 5. Apex of a branch, with *ceramidia*. 6. A ceramidium. 7. Spores from the same. 8. Transverse section of the frond.

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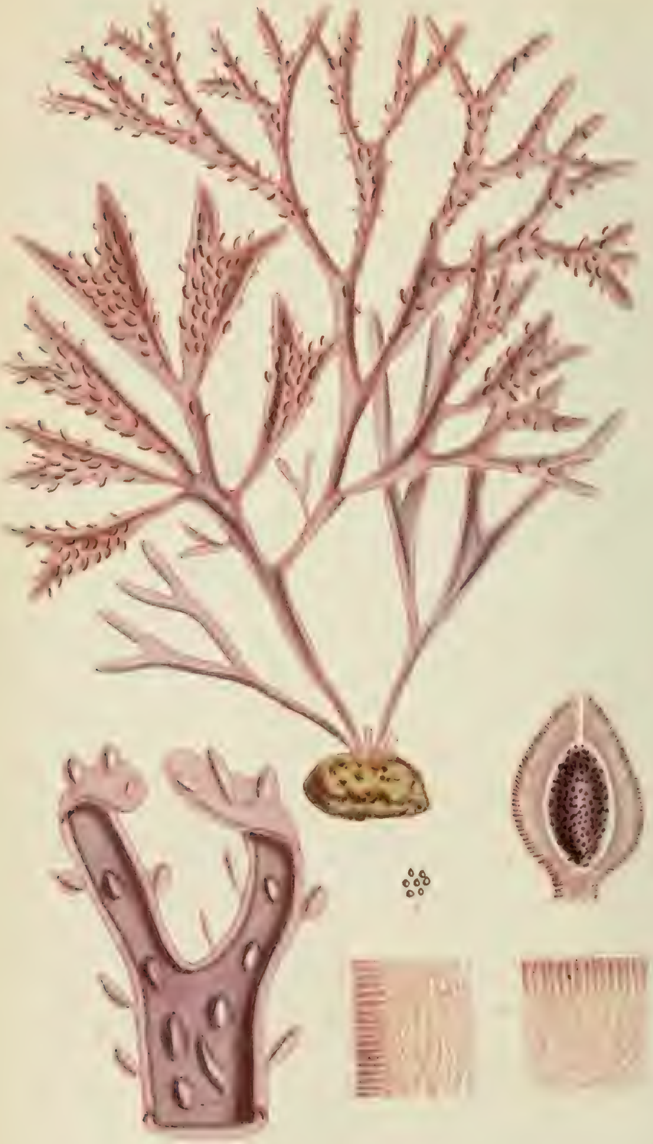

PLATE CXCIX.

GIGARTINA MAMILLOSA, *J. Ag.*

GEN. CHAR. *Frond* cartilaginous, either filiform, compressed, or flat, irregularly divided, purplish-red; the axis, or central substance, composed of branching anastomosing longitudinal fibres; the periphery of dichotomous filaments, laxly set in pellucid jelly; their apices moniliform, strongly united together. *Fructification* double, on distinct plants; 1, external *tubercles,* containing, on a central placenta, dense clusters of *spores,* scattered among the filaments of the periphery. GIGARTINA (*Lamour.*),—from γιγαρτον, a *grape stone*; which the tubercles resemble.

GIGARTINA *mamillosa*; frond flabelliform, dichotomous, plane, channelled; segments wedge-shaped, cleft; tubercles roundish or ovate, pedicellate, scattered over the disc of the frond.

GIGARTINA mamillosa, *J. Ag. Alg. Medit.* p. 104. *Endl. 3rd Suppl.* p. 42.

MASTOCARPUS mamillosus, *Kütz. Phyc. Gen.* p. 398.

CHONDRUS mamillosus, *Grev. Alg. Brit.* p. 127. *Hook. Br. Fl.* vol. ii. p. 302. *Wyatt, Alg. Danm.* no. 117. *Harv. in Mack. Fl. Hib.* part 3. p. 201. *Harv. Man.* p. 77.

SPHÆROCOCCUS mamillosus, *Ag. Syn.* p. 29. *Lyngb. Hyd. Dan.* p. 14. t. 5. *Ag. Sp. Alg.* vol. i. p. 260. *Ag. Syst.* p. 220. *Hook. Fl. Scot.* part 2. p. 102. *Grev. Fl. Edin.* p. 295. *Spreng. Syst. Veg.* vol. iv. p. 336.

FUCUS mamillosus, *Good. and Woodw. in Linn. Trans.* vol. iii. p. 174. *Turn. Syn.* p. 237. *Turn. Hist.* t. 218. *E. Bot.* t. 1054.

FUCUS polymorphus, *(fourth series) Lam. Diss.* p. 3. t. 17. f. 37. t. 18. f. 38.

FUCUS echinatus, *Stack. Ner. Brit.* p. 65. t. 12.

FUCUS canaliculatus β., *Huds. Fl. Ang.* p. 583.

FUCUS ceranoides, vars. *Lightf. Fl. Scot.* p. 916. *Gmel. Hist.* p. 115. *With. Arr.* vol. iv. p. 99.

FUCUS alveolatus, *Esper. Ic.* p. 139. t. 70.

HAB. On rocks near low-water mark. Perennial. Winter. Common on all our rocky shores.

GEOGR. DISTR. Atlantic shores of Europe and North America.

DESCR. *Root*, a membranous expansion. *Fronds* tufted, from four to eight inches long or more, rising with an undivided stem or stipes, which is filiform at base, but almost immediately becomes compressed, and then flattened, widening gradually upwards till it attains from an eighth to a quarter of an inch in breadth. At an inch or two above the base, the stipe forks; and this mode of branching, repeated again and again, results in a many times dichotomous, flabelliform frond. The branches are more or less channelled by the introflexion of the margin; they are very commonly twisted, often in a spiral manner; and the upper ones are gradually more and more expanded, often becoming broadly wedge-shaped. Sometimes the frond remains nearly linear throughout. The surface of barren specimens is smooth, but fertile individuals are more or less densely sprinkled over with filiform processes, which are sometimes prolonged to two or three lines; but more commonly are shorter, swelling in their upper part into an oval or globose tubercle. These processes, though sometimes borne on both surfaces, are generally most abundant on the channelled side. The *tubercles* contain, within a thick wall composed of radiant fibres, an elliptical mass of densely packed, minute *spores*. I have not seen *tetraspores*. The *structure* of the frond is dense. Its *substance* tough, between cartilaginous and leathery, very rigid when dry, and not adhering to paper. The *colour* a very dark, brownish purple, becoming brighter and more pinky after long steeping in fresh water.

A common species on all parts of our shores, and dispersed throughout the Atlantic basin. Notwithstanding its well-marked characters, it has been confounded at one time with *Fucus canaliculatus*: an error hardly to be anticipated, when the substance and colour are so exceedingly unlike; and afterwards with *Chondrus crispus*, to which there is a closer resemblance, though the channelled frond, rough with papillæ, clearly distinguish the present plant to the naked eye; while a difference in structure has latterly caused them to be placed in distinct genera. *Gigartina mamillosa* was first accurately determined and described by Goodenough and Woodward, in 1797. Its claims to specific rank have been generally admitted since that time, except by Lamouroux, who considers it a variety of *C. crispus*. Some states of the latter it, indeed, closely resembles, but is always distinguished by the channelled frond. Its officinal properties are similar to those of the *Chondrus*, and it is, on some shores, indiscriminately collected with that species, and dried as "*Carrigeen*."

I regret that our plate has been printed in rather too pale an ink.

Fig. 1. CHONDRUS MAMILLOSUS:—*of the natural size*. 2. Apex of a fertile frond:—*slightly magnified*. 3. Vertical section of a tubercle. 4. Spores from the same. 5. Vertical semisection of the frond. 6. Transverse section of the same:—*highly magnified*.

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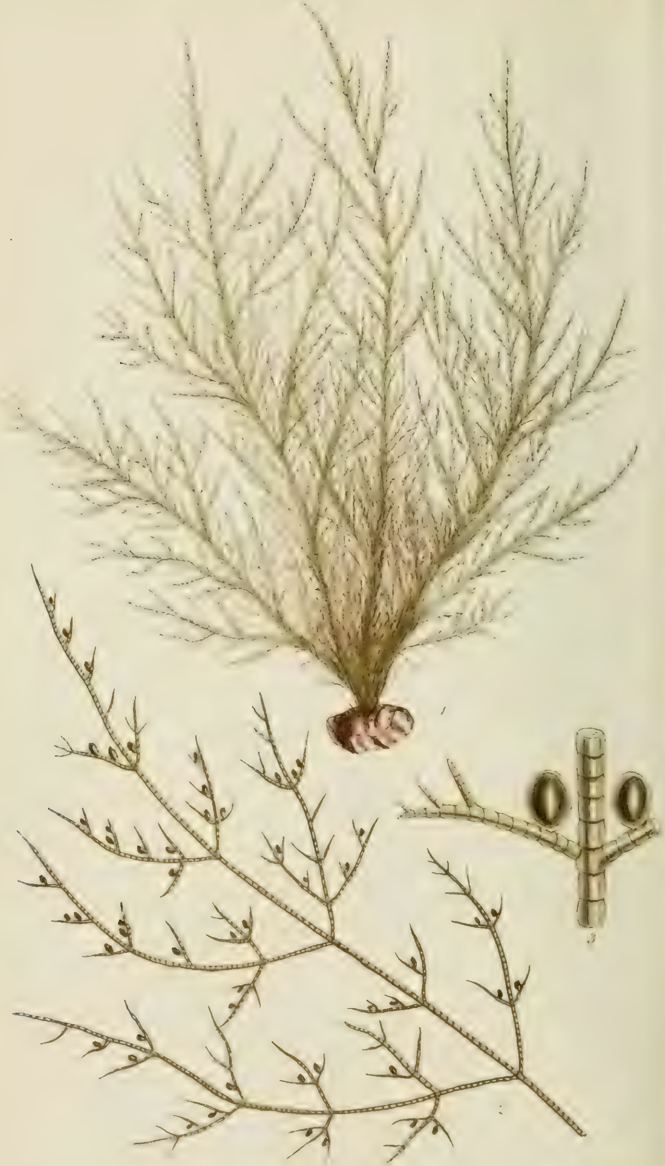

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PLATE CC.

ECTOCARPUS GRANULOSUS, *Ag.*

GEN. CHAR. *Frond* capillary, jointed, olive or brown, flaccid, single-tubed. *Fruit* either spherical, elliptical, or lanceolate *utricles* (or *spores*) borne on the ramuli, or imbedded in their substance. ECTOCARPUS (*Lyngb.*),—from *εκτος*, *external*, and *καρπος*, *fruit.*

ECTOCARPUS *granulosus*; filaments olive, the principal divisions slightly entangled; branches free, feathery; the lesser branches and ramuli opposite, spreading; utricles elliptical, dark coloured, sessile on the ramuli.

ECTOCARPUS granulosus, *Ag. Syst.* p. 163. *Ag. Sp. Alg.* vol. ii. p. 45. *Harv. in Hook. Fl. Brit.* vol. ii. p. 326. *Harv. in Mack. Fl. Hib.* part 3. p. 182. *Endl.* 3rd *Suppl.* p. 21. *Harv. Man.* p. 42. *Wyatt, Alg. Danm.* no. 38.

CONFERVA granulosa, *E. Bot.* t. 2351.

HAB. On rocks; also on Corallines and various other Algæ, in rock-pools between tide marks. Annual. May and June. Not uncommon on the English and Irish coasts.

GEOGR. DISTR. Heligoland. Coast of France.

DESCR. *Root*, a small disc. *Filaments* more or less densely tufted, capillary, from four to eight or ten inches long, much branched, with more or less of a principal, undivided stem, furnished with lateral branches of unequal length, so that the habit is often virgate. The chief divisions somewhat matted together, but all the lesser ones free and distinct, standing out on all sides, in a feathery manner. Lesser branches and ramuli very generally opposite, sometimes alternate, spreading at wide angles, unequal, long and short intermixed together without order, somewhat attenuated. *Apices* rather acute. *Articulations* about as long as broad, faintly striate longitudinally. *Utricles* abundantly scattered on the ramuli, elliptical, dark-coloured, with a narrow limbus, sessile on the upper faces of the ramuli. *Colour*, when quite fresh, a clear olive, becoming green in fresh water, and often yellowish as the plant increases in age. *Substance* soft, but not gelatinous, adhering to paper in drying.

A well-marked and large growing species, originally discovered by Mr. Borrer, and first described and figured in English Botany. It is by no means uncommon on various parts of the coasts, usually growing on the smaller Algæ in tide-pools, though occasionally flourishing on the fronds of *Laminariæ.* The opposite branches and ramuli, bearing dark-coloured elliptical utricles on their upper side, readily distinguish this plant from any of its British congeners. The species, which most nearly approach it, are *E. sphærophorus* and *E. brachiatus*, but both these differ in fructification. In some varieties the ramuli are not regularly opposite. It is frequently a difficult matter to trace the affinity of such wayward forms; and possibly one or two species, now confounded with *E. granulosus*, may eventually be separated.

Fig. 1. Tuft of ECTOCARPUS GRANULOSUS:—*of the natural size.* 2. Portion of a fertile branch. 3. Ramuli and utricles from the same:—*both magnified in different degrees.*

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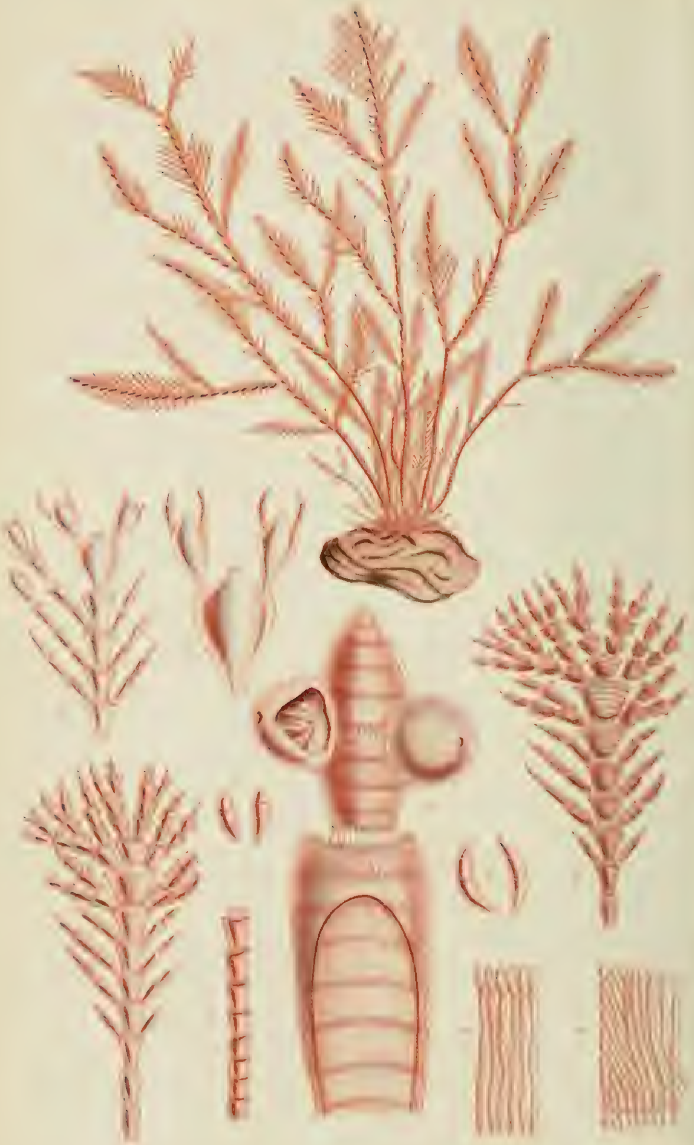

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PLATE CCI.

CORALLINA SQUAMATA, *Park.*

GEN. CHAR. *Frond* filiform, articulated, branched (mostly pinnate), coated with a calcareous deposit. *Fructification*; turbinate or obovate, mostly terminal *ceramidia*, pierced at the apex by a minute pore, and containing a tuft of erect, pyriform, or club-shaped, transversely parted *tetraspores*. CORALLINA (   ),—from *Coralium, coral,* which these plants resemble in their stony nature.

CORALLINA *squamata*; decompound-pinnate; lower articulations cylindrical, scarcely longer than their breadth; upper obconical or obcordate, compressed, two-edged, their upper angles sharp and prominent; ultimate ramuli very slender, acute.

CORALLINA squamata, *Parkinson*, 1296. *Ellis, Cor. Pl.* p. 24. fig. *c. C. Ellis and Soland. Zoop.* p. 117. *Turt. Gmel.* vol. iv. p. 671. *Turt. Br. Faun.* p. 211. *Stew. Elem.* vol. ii. p. 439. *Lamour. Cor. Flex.* p. 287. *Lam. Coral.* p. 129. *Lam. An. s. Vert.* vol. ii. p. 329. *Gray, Br. Pl.* vol. i. p. 340. *Fl. Br. An.* p. 515. *Johnst. Br. Sponges and Corallines*, p. 222. *Decaisne, Ess.* p. 108, *Kütz. Phyc. Gen*, p. 388. *Endl. 3rd Suppl.* p. 48.

HAB. On submarine rocks, at the extremity of low-water mark. Perennial. Summer. South coast of England, *Ellis,* &c. Abundant at Miltown Malbay, West of Ireland, *W. H. H.* Youghal, *Miss Ball.* Jersey, *Miss Turner.*

GEOGR. DISTR. Atlantic shores of France and Spain. Canary Islands.

DESCR. *Root*, a widely spreading, calcareous crust. *Fronds* densely tufted, forming frequently large patches some yards in breadth, four to six inches high, twice as thick as hog's bristle, with an undivided or once or twice forked stem, set with distichous erecto-patent, more or less decompoundly pinnate branches. These branches are very irregular in length and in their degree of composition, some specimens being comparatively bare, others closely and many times pinnate. The penultimate branches or *plumules*, are from half an inch to an inch long, with a lanceolate or obovate outline, closely pectinato-pinnate, the pinnules opposite, a pair rising from every joint, subulate, and either simple or minutely pinnulate. The ultimate ramuli at the apices of the branches are di-trichotomous, a circumstance which, no doubt, accounts for the irregularity of ramification. *Articulations* of the lower part of the stem, very short, rounded, bead-like, with obtuse angles; the upper ones gradually becoming longer, broader, and flatter, with more and more prominent upper angles, until towards the summit of the stem, as well as in the lesser branches, all the articulations are broadly obconic, compressed, with very salient and acute upper angles. Articulations of the subulate ramuli not half the diameter of the others, more cylindrical, and thrice as long as their breadth, the terminal one acute. *Conceptacles* (probably of three kinds, two of which only are known to me); 1, urn-shaped, formed out of the last articulation of a branch, or ramulus, simple, or crowned at its superior angles with pair of horn-like ramuli, or with another series of similar conceptacles of a smaller size; in these (fig. 3.) I have observed *trispores* (fig. 4). 2, hemispherical conceptacles, of a very minute size, resembling grains of sand, plentifully scattered, like warts, over the surface, hollow, exhibiting (when the calcareous matter is removed) a beautifully tessellated surface, and containing a tuft of crescent-shaped, transversely parted tetraspores (fig. 8). When the frond is macerated in acid, the lime is dissolved, and the joints exhibit regular transverse bands, and a longitudinal section shows the substance to be composed of very slender, perpendicular, elongated, cylindrical cells, alternating with smaller ones, and the outer ones, curving outwards at the tips, and ending at the circumference in a minute cell. *Colour*, a dark purple, soon fading on exposure.

This species was noticed at an early period, and has been generally kept separate from *C. officinalis*, which it closely resembles, by most authors who have written on the subject. It differs from *C. officinalis* chiefly in the form of the upper joints of the stem and branches, which are broad and flat, with prominent and usually sharp angles. As far as my experience goes, these characters are pretty constant.

The greatest anomaly which I have observed in this plant, is in the fructification, and this is so remarkable that had I not found it on specimens from the same locality, and otherwise the same, I should have been afraid to describe plants with such different fruit as identical. There appear to be three distinct forms of *Ceramidium* borne by *C. squamata*; the first, that proper to the genus, and which I have not found on the specimens figured: secondly, that proper to *Jania* (fig. 2, 3); and thirdly, that proper to *Amphiroa* (fig. 7). These two last I have found abundantly both on French and Irish specimens. Both the latter kinds of *Ceramidium* contain tetraspores, but those found in one of them are deficient in one joint. It is rather unfortunate for the stability of the genera into which the Linnæan *Corallina* has been split, to find an acknowledged species of one of the genera producing the fruit attributed to *both* the others!

Fig. 1. CORALLINA SQUAMATA:—*of the natural size.* 2. Apex of a fertile branch, with *urn-shaped* conceptacles. 3. A conceptacle, bearing two lesser ones. 4. *Trispores* from the same. 5. A branch with *wart-like* conceptacles, in its natural state. 6. The same, treated with acid, the lime being removed. 7. Terminal joints with fruit, from the same, showing a longitudinal *section* of the joint, and the interior of one conceptacle. 8. Tetraspores. 9. Basal joints. 10, 11. Cells of which the frond is built up:—*all more or less highly magnified.*

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Plate CCII.

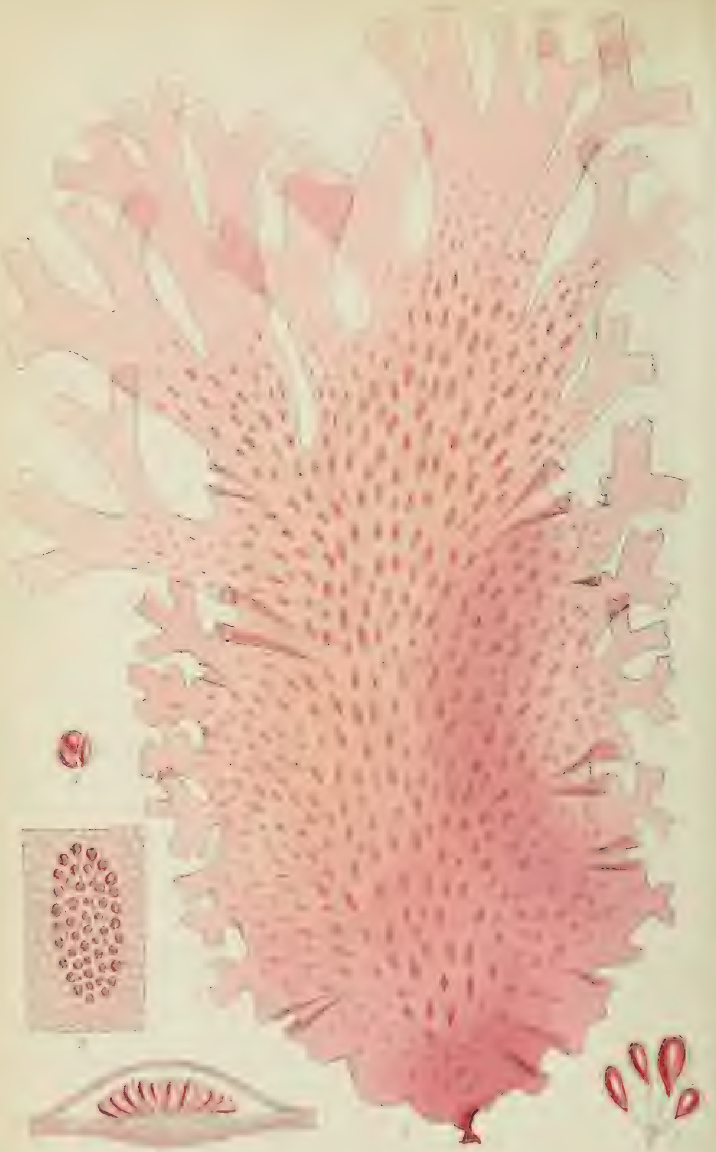

PLATE CCII.

NITOPHYLLUM PUNCTATUM, *Grev.*

GEN. CHAR. *Frond* membranaceous, reticulated, rose-red (rarely purplish), irregularly cleft, veinless, or furnished with irregular veins towards the base. *Fructification* two-fold, on distinct plants; 1, convex *tubercles* (*coccidia*) immersed in the frond, and containing a mass of spores; 2, *tetraspores*, grouped into definite *sori* or spots, variously scattered over the frond. NITOPHYLLUM (*Grev.*),—corruptly formed from *nitor*, to *shine*, and φυλλον, a *leaf*.

NITOPHYLLUM *punctatum*; frond very thin and delicate, destitute of nervures, either regularly dichotomous, or cleft into two or three principal segments, whose margins are fringed with dichotomous lobes; axils rounded; spots of granules large, oblong, scattered over the whole surface of the frond.

NITOPHYLLUM punctatum, *Grev. Alg. Brit.* p. 79. t. 12. *Hook. Br. Fl.* vol. ii. p. 287. *Harv. in Mack. Fl. Hib.* part 3. p. 192. *Harv. Man.* p. 57. *Hook. fil. et Harv. Lond. Journ.* vol. vi. p. 403.

AGLAIOPHYLLUM punctatum, *Mont. Endl. 3rd Suppl.* p. 52. *Kütz. Phyc. Gen.* p. 443.

WORMSKIOLDIA punctata, *Spreng. Syst. Veg.* vol. iv. p. 331.

DELESSERIA punctata, *Ag. Sp. Alg.* vol. i. p. 186. *Ag. Syst.* p. 252. *Hook. Fl. Scot.* part 2. p. 101. *Grev. Fl. Edin.* p. 294.

DELESSERIA ulvoides, *Hook. Fl. Scot.* part 2. p. 101.

FUCUS punctatus, *With. Br. Ar.* (Ed. 6) vol. iv. p. 120. *E. Bot.* t. 1575. *Turn. Hist.* t. 71.

FUCUS ulvoides, *Turn. Hist.* t. 80.

ULVA punctata, *Stack. in Linn. Trans.* vol. iii. p. 236.

Var. β. *ocellatum*; frond with a roundish outline, cleft nearly to the base, the segments repeatedly dichotomous, linear.

NITOPHYLLUM punctatum, β. ocellatum, *Harv. Man.* p. 57.

NITOPHYLLUM ocellatum, *Grev. Alg. Brit.* p. 78. *Hook. Br. Fl.* vol. ii. p. 286. *Wyatt, Alg. Danm.* no. 15. *J. Ag. Alg. Medit.* p. 156.

AGLAIOPHYLLUM ocellatum, *Mont. in Zanard. Saggio.*, &c. p. 46. *Endl. 3rd Suppl.* p. 52. *Kütz. Phyc. Gen.* p. 443.

DELESSERIA ocellata, *Lam. Ess.* p. 125. *Ag. Sp. Alg.* vol. i. p. 187. *Ag. Syst.* p. 252. *Grev. Crypt.* t. 347.

WORMSKIOLDIA ocellata, *Spreng. Syst. Veg.* vol. iv. p. 331.

HALYMENIA ocellata, *Duby, Bot. Gall.* p. 945.

FUCUS ocellatus, *Lam. Diss.* t. 32.

FUCUS granateus, *Lam. Diss.* t. 33. f. 3, 4.

Var. γ. *crispatum*; frond thickish, cleft nearly to the base, the segments irregularly dichotomous, linear, with the margin strongly curled.

Var. δ. *Pollexfenii*; frond proliferous, the young segments broadly obovate, rounded, very entire, or bifid.

NITOPHYLLUM POLLEXFENII, *Grev. MSS. in Herb.*

Var. ε. *fimbriatum*; segments broadly obovate, fringed with narrow, forked processes.

HAB. Attached to various Algæ, in pools at the extremity of low-water mark; but, more abundantly, and of much larger size, beyond the tidal influence in 4–15 fathom water. Annual. Summer. Not uncommon on the British and Irish shores, in many localities, from Orkney to Cornwall. Exceedingly abundant and of great size on the coast of Antrim; and in Roundstone Bay, Galway. β. Torquay and Budleigh, *Mrs. Griffiths.* Penzance, *Mr. Ralfs.* Mount Edgecombe, *Rev. W. S. Hore.* Forres, *Mr. Brodie.* Bantry Bay, *Miss Hutchins.* γ. Kilkee, *W. H. H.* Roundstone Bay, *Mr. M'c Calla.* Mount Batten, *Mr. Rohloff.* δ. Orkney, *Rev. J. H. Pollexfen.* ε. Roundstone Bay, *Mr. M'Calla.*

GEOGR. DISTR. Atlantic shores of Europe and North America. Mediterranean Sea. Tasmania.

DESCR. *Root*, a small disc. *Fronds* growing in tufts, exceedingly variable in size and form, according to locality: commonly from four to twelve or even twenty inches in length, and as much in breadth; and occasionally measuring five feet in length, and three in breadth, variously divided. In some specimens the main frond is nearly simple, or but once forked, broadly obovate, or oblong, with the margin divided into numerous linear lobes, from half an inch to an inch in width, two or three inches long, once or twice forked, their ultimate lobes somewhat digitate. The margin of such specimens is so extended in proportion to the disc, as to form large undulations or folds, when the plant is floating in water; and when displayed on paper the parts lie over each other, rendering it difficult to display the form fully. The opposite to this form is found in our var. β, in which the whole frond is divided to the base into linear, dichotomous lobes, with a perfectly flat margin. In γ. the substance is thick, of a darker colour, brownish when dry; the frond is from half an inch to an inch broad, six or eight inches long, dichotomous, with the margin minutely, but strongly curled: δ. is also thicker than the usual form, cuneate at base, variously lobed, the lobes flat, broadly obovate, with a rounded margin; and it often has the appearance of sprouting from an old frond: ε. is much thinner than the others, without fruit, roundish, the margin cut into minute forked lobes, not a line in breadth. There are many other states, which connect these several varieties together. *Fructification* thickly scattered over the whole surface; *tubercles* as large as turnip-seed, hemispherical, containing a cluster of stalked, obovate spores. *Spots* of tetraspores large, a line or more in length, oblong, dark-red, containing numerous grains. *Substance* delicately membranaceous, closely adhering to paper, and glossy when dry. *Colour*, a fine rosy pink, generally well preserved in drying.

Plate CCII. Fig. 1. NITOPHYLLUM PUNCTATUM; a small plant, of the normal form:—*of the natural size.* 2. A *sorus.* 3. A *tetraspore* from the same. 4. Vertical section of a tubercle. 5. Tuft of spores from the same.

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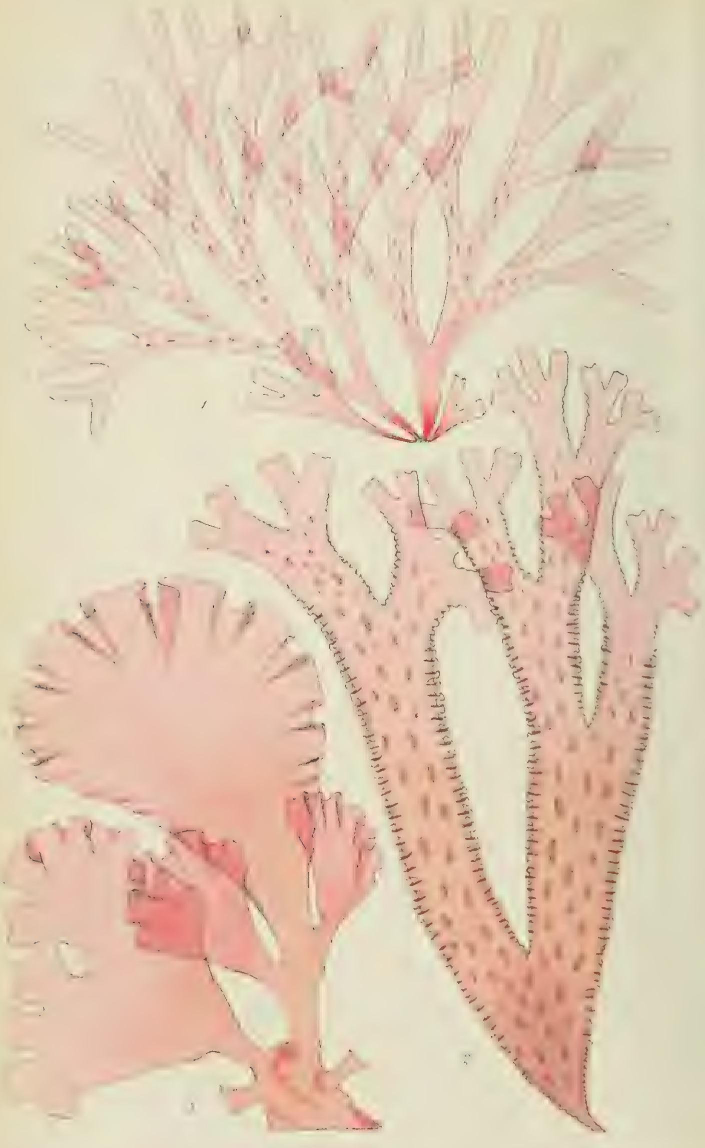

W. H. H. del et lith

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PLATE CCIII.

NITOPHYLLUM PUNCTATUM; *vars. β. γ. δ.*

(For description, see last folio.)

I have thought it necessary, for the proper illustration of *Nitophyllum punctatum* to give two plates, showing some of the principal forms which this variable plant assumes. Some of these look so distinct that many authors regard them as separate species, and it is not without having carefully examined the subject and consulted a very extensive suite of specimens, that I have formed an opposite opinion.

At Plate CCII. is represented what I regard as the normal or typical form of the species. This varies much in size, and sometimes grows to the length of many feet, in which case the dichotomous lobes are often several inches in length, but their proportions, as respects the whole frond, are not much altered. Between this form and fig. 1. of PLATE CCIII. which represents our var. β, the *Nitophyllum ocellatum* of authors, there appears at first sight a considerable difference; the extreme and regular division of this variety, and the flatness of its margin, showing apparently well marked characters. But innumerable intermediate forms connect the two; so that Dr. Greville and Mrs. Griffiths, who formerly recognised two species, now regard *N. ocellatum* as merely an extreme state of *N. punctatum.*

Our var. γ (Pl. CCIII. fig. 2.) is in some degree an intermediate form, exhibiting the dichotomous division of one, with the curled margin of the other. At the same time, its thicker substance, dark colour, and the minute and close curling of the margin mark a distinct variety. This variety has a strong resemblance to *N. crispatum* of the Flora Antarctica, but differs in fructification, the spots of granules in that species being as minute, as in *N. Hilliæ.*

Our var. δ (Pl. CCIII. fig. 3.) is still another form. In this, the lobes, instead of being narrow and forked, are the widest portions of the frond, and become singularly rounded and almost reniform. The outline of many specimens of this variety, which I have only seen in the Herbarium of Mr. Pollexfen, to whom I am indebted for the specimen figured, is very similar to that of *Kalymenia reniformis.* Like var. γ, its substance is thicker, and colour generally more full than in either of the preceding states of the species.

Var. ε is like a combination of vars. *a* and δ; the lobes of the frond being obovate as in the latter, but fringed with dichotomous lobes as in the former. Its claim to rank as a distinct variety rests on the narrowness and minute division of these marginal lobes. I regret that there was not room to introduce a figure of this variety into our plate.

Fig. 1. NITOPHYLLUM PUNCTATUM:—β. ocellatum. 2. γ. crispatum. 3. δ. Pollexfenii:—*all the natural size.*

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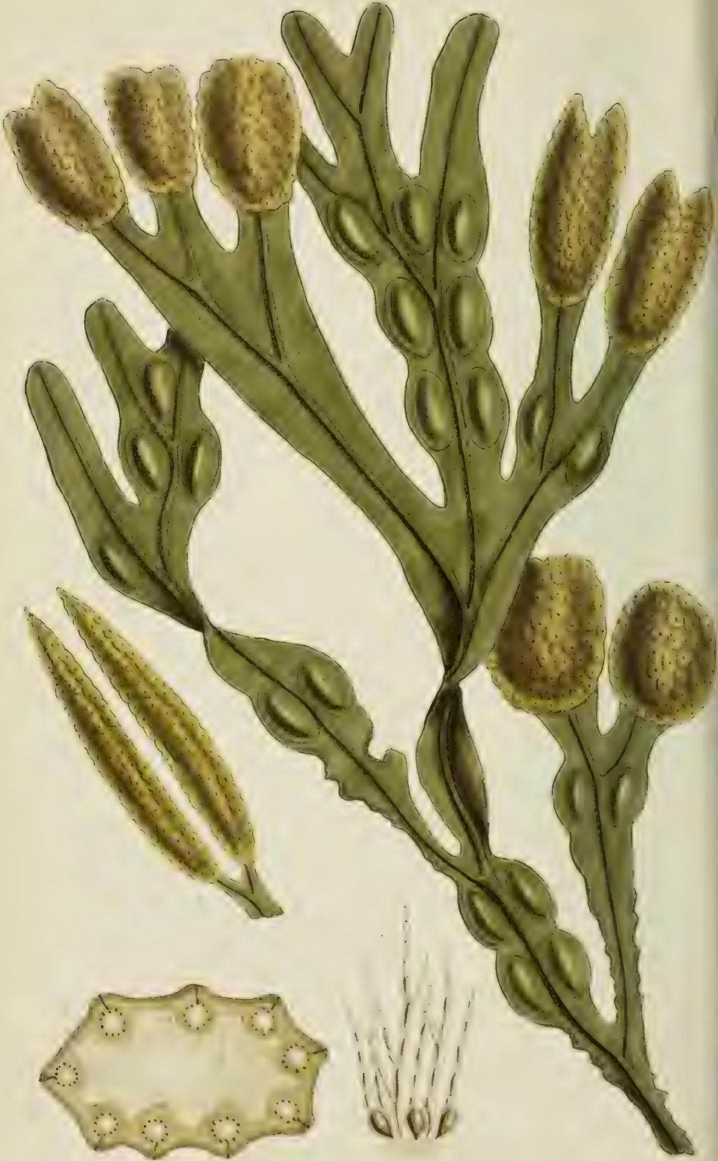

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PLATE CCIV.

FUCUS VESICULOSUS, *Linn.*

GEN. CHAR. *Frond* linear, either flat, compressed or cylindrical, dichotomous (rarely pinnated), coriaceous. *Air-vessels* when present, innate, simple. *Receptacles* either terminal or lateral, filled with mucus traversed by a net-work of jointed fibres, pierced by numerous pores which communicate with immersed, spherical *conceptacles,* containing parietal *spores* or *antheridia,* or both. FUCUS (*L.*),—φυκος, a *sea-weed.*

FUCUS *vesiculosus;* frond flat, coriaceous, thick, linear, dichotomous, quite entire at the margin, mid-ribbed; air-vessels globose or elliptical, mostly in pairs (often absent); receptacles turgid, elliptical, ovate, or lanceolate, terminal.

FUCUS vesiculosus, *Linn. Sp. Pl.* p. 1626. *Linn. Fl. Lap.* p. 366. *Huds. Fl. Ang.* p. 576. *Lightf. Fl. Scot.* p. 904. *Stack. Ner. Brit.* p. 3. t. 2. and p. 12. t. 6. *Esper. Ic.* p. 35. t. 12. 13. and p. 160. t. 83. 84. *Velley,* t. 1. *With. Bot.* vol. iv. p. 84. *Gunn. Fl. Norv.* vol. i. p. 48. *Roth, Fl. Germ.* vol. iii. p. 442. *Turn. Syn.* p. 117. *Turn. Hist.* t. 88. *Lamour. Ess.* p. 18. *E. Bot.* t. 1066. *Lyngb. Hyd. Dan.* p. 3. t. 1. *Ag. Sp. Alg.* vol. i. p. 87. *Ag. Syst.* p. 275. *Grev. Crypt. Fl.* t. 319. *Grev. Alg. Brit.* p. 12. t. 2. *Hook. Br. Fl.* vol. ii. p. 267. *Wyatt, Alg. Danm.* no. 152. *Harv. in Mack. Fl. Hib.* part 3. p. 168. *Harv. Man.* p. 20. *Kütz. Phyc. Gen.* p. 351. t. 33, 34, 35, 36. *Endl. 3rd. Suppl.* p. 29. *Mont. Fl. Canar. Cell.* p. 139. *Mont. Fl. Algier.* p. 21. *Harv. in Bot. Beechey,* p. 163 and 406.

FUCUS divaricatus, *Linn. Sp. Pl.* p. 1627. *Lightf. Fl. Scot.* p. 909. *Esp. Ic.* t. 11.

FUCUS inflatus, *Linn. Sp. Pl.* p. 1627. *Lightf. Fl. Scot.* p. 910.

FUCUS spiralis, *Linn. Sp. Pl.* p. 1627. *Stack. Ner. Brit.* t. 5. *E. Bot.* t. 1685. *Fl. Dan.* t. 286. *Huds. Fl. Ang.* p. 577. *Lightf. Fl. Scot.* p. 911.

FUCUS volubilis, *Huds. Fl. Ang.* p. 577.

FUCUS Sherardi, *Stack. Ner. Brit.* p. 72. t. 13. *J. Ag. Alg. Medit.* p. 46.

FUCUS linearis, *Huds. Fl. Ang.* p. 578.

FUCUS distichus, *Lightf. Fl. Scot.* p. 912. (not of Linn.)

β. *subecostatus;* very small, densely tufted, with an indistinct mid-rib, and destitute of vesicles.

FUCUS balticus, *Ag. Sv. Bot.* t. 516. *Grev. Crypt. Fl.* t. 181.

HAB. On rocks and stones left exposed at low water; also on artificial piers and quays in æstuaries, extending up rivers as long as the water remains sensibly brackish. Perennial. Summer and winter. Very abundant on the British coasts. β. in salt marshes, occasionally flooded. Near Dunstaffnich Castle and Isle of Kerera, *Mr. Maughan.* Appin, *Capt. Carmichael.* Arran, *Sir W. J. Hooker.* Bute, *Dr. Greville.* Baldoyle and Roundstone Bay, (bearing fructifications), *Mr. M'Calla.*

GEOGR. DISTR. Atlantic shores of Europe and North America. Mediterranean Sea. Baltic. The Icy Sea. White Sea. Iceland. Greenland. Nova Zembla. Spitsbergen. California. Sitcha and Sachalin. Siberia at Ochotsk and Kamtskatka. Canary Islands. South Brazil (?). Cape of Good Hope (?), *Ecklon*.

DESCR. *Root*, an expanded, conical disc. *Fronds* from two inches to two or three feet in length, and from a line to nearly an inch in breadth, flat, furnished with a strong, compressed, percurrent mid-rib, many times dichotomous, sometimes spirally twisted; the margin very entire. *Air-vessels* generally in pairs, one at each side of the mid-rib, spherical or oval, their size varying with the breadth of the frond, formed at uncertain intervals along the segments. *Receptacles* terminal, turgid, and full of lax mucus, variable in form, elliptical, ovate, or linear-lanceolate, sometimes forked, diœcious; those producing spores, of a greenish-olive colour; those with antheridia, a more or less bright orange yellow. *Substance* thickish and very tough. *Colour*, a dark olive, paler in the younger parts.

The commonest and one of the most widely diffused species of the restricted genus *Fucus*. It abounds along the shores of the Northern Atlantic, extending even to the tropics, and is said to have been found in the Southern portion of that Ocean, but the Southern localities want confirmation. In the Pacific, it has been collected on the N. West coast of America.

As may be judged by the numerous synonyms, this is rather a variable plant, but the variations may be summed up in a few words. The first and most obvious is in size; some specimens, fully grown and in fruit, being not an inch in length, while others extend to several feet. The dwarfish individuals, constituting our var. β, grow in brackish water and in muddy places. Other varieties are destitute of air-vessels; or have the air-vessels of a lengthened figure: and others vary in the shape of the fructification, the receptacle being sometimes globose, sometimes ellipsoidal, and sometimes spindle-shaped. Lastly, the frond is frequently spirally twisted. On characters such as these, the *eight* book-species, quoted as synonyms, have been constituted.

Fucus vesiculosus is largely used in the manufacture of kelp; and also yields *mannite* in considerable quantity. In the north of Europe, when the vegetation of the land ceases, or is covered with snow, it furnishes an abundant winter fodder for cattle, which regularly visit the shores, at the retreat of the tide, in search of it. Various are the uses to which the Icelanders and Greenlanders apply it, as Linnæus and others inform us.

Fig. 1. FUCUS VESICULOSUS; a branch. 2. A pair of lanceolate receptacles:—*both of the natural size*. 3. Section of a spore-bearing receptacle. 4. *Spores* and paraphyses from the same:—*both magnified*.

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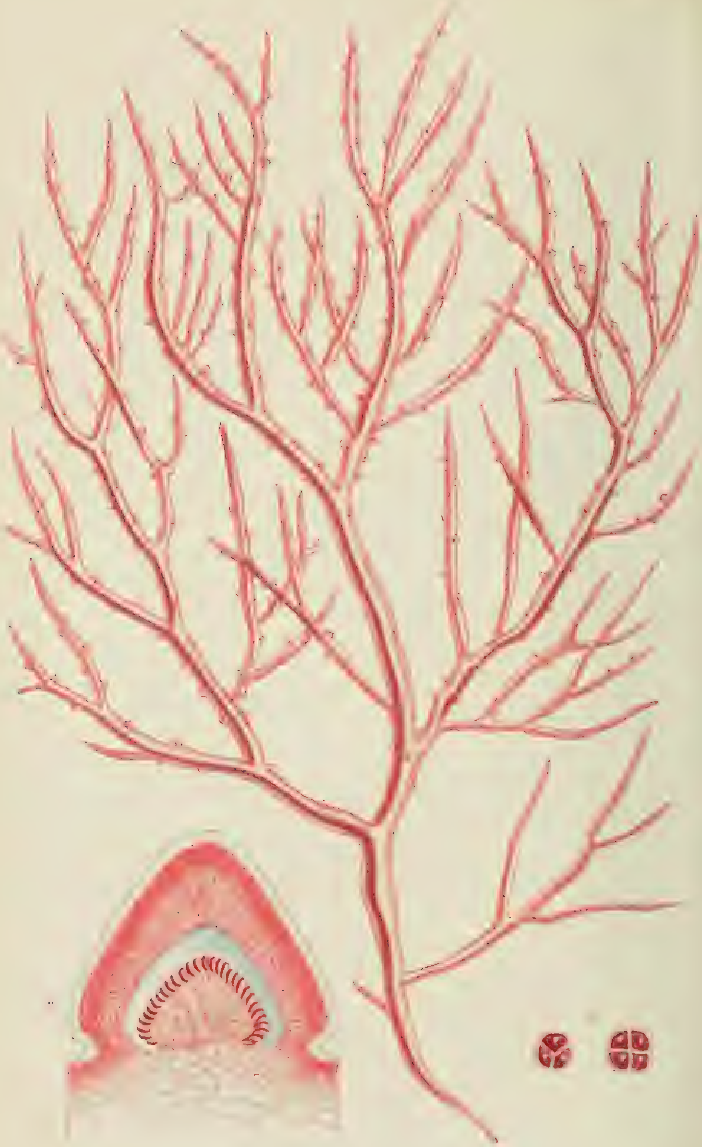

PLATE CCV.

GRACILARIA COMPRESSA, *Grev.*

GEN. CHAR. *Frond* filiform, or rarely flat, carnoso-cartilaginous, continuous, cellular; the central cells very large, empty, or full of granular matter; those of the surface minute, forming densely packed, vertical filaments. *Fructification* of two kinds on distinct individuals; 1, convex *tubercles* (*coccidia*) having a thick pericarp composed of radiating filaments, containing a mass of minute spores on a central placenta; 2, *tetraspores* imbedded in the cells of the surface. GRACILARIA (*Grev.*)—from *gracilis*, slender.

GRACILARIA *compressa*; frond succulent, brittle, somewhat compressed, alternately or subdichotomously branched; branches long and mostly simple, tapering to a fine point; tubercles ovate or subglobose, sessile, scattered plentifully over the branches; tetraspores tripartite or cruciate.

GRACILARIA compressa, *Grev. Alg. Brit.* p. 125. *J. Ag. Alg. Medit.* p. 151.

PLOCARIA compressa, *Endl. 3rd Suppl.* p. 51. *Mont. Fl. Algier.* p. 71.

GIGARTINA compressa, *Hook. Br. Fl.* vol. ii. p. 299. *Wyatt, Alg. Danm.* n. 25. *Harv. Man.* p. 74. *De Not. Alg. Ligust.* p. 14.

SPHÆROCOCCUS compressus, *Ag. Sp. Alg.* vol. i. p. 308. *Ag. Syst.* p. 233. *Spreng. Syst. Veg.* vol. iv. p. 338. *Kütz. Phyc. Gen.* p. 408.

SPHÆROCOCCUS lichenoides, *Grev. Crypt. Fl.* t. 341. *(not of Agardh.)*

HAB. Cast on shore from deep water, attached to corallines, &c. Annual. Summer. Very rare. At Sidmouth, *Mrs. Griffiths* (1813) and *Miss Cutler*. Jersey, *Miss Turner*.

GEOGR. DISTR. Atlantic coasts of France and Spain. Mediterranean Sea.

DESCR. *Root*, a small expanded callus. *Fronds* several from the same base, six to twelve inches long or more, from a line to two lines in diameter, brittle, much, but very irregularly, branched. *Branches* sub-compressed, sometimes nearly distichous, frequently more or less quadrifarious, alternate or secund, rarely opposite, simple or forked, elongated and gradually tapering to an acute point, sometimes much attenuated, naked or furnished with a few scattered subulate ramuli, or bearing (in large specimens) a second or third series of lesser branches. *Tubercles* large and prominent, obtusely conical, sessile on the branches, over which they are very plentifully scattered, containing, under a thick wall composed of radiating fibres, a conical mass of minute *spores* attached to filaments issuing from a central point. *Tetraspores* imbedded in the surface cells of distinct plants, irregularly dispersed, roundish, either tripartite or cruciate. *Substance*, when fresh, very tender and brittle, succulent, and breaking by its own weight if hastily removed from the water; becoming tough in drying. *Colour*, a transparent, dull red, which becomes much brighter after the plant has been steeped in fresh water.—It adheres to paper in drying, and shrinks considerably.

This beautiful plant was added to the British Flora by Mrs. Griffiths in the year 1813, and has been occasionally, but very irregularly, found in the same locality since that period, In some seasons it makes its appearance in considerable plenty, and may not again be seen for several years. I believe it has always been found among rejectamenta, as if cast up from deep water. The south coast of England is perhaps its northern limit. On the French and Spanish coasts, and especially in the Mediterranean, it is much more abundant; but British specimens are quite as large and as abundantly covered with fructification as any from more southern stations. In many characters it bears a close resemblance to the *G. lichenoides* of the East Indies, with which Dr. Greville formerly associated it; and Mrs. Griffiths, in the belief that these plants were identical, prepared a *pickle* and a *preserve*—both of which proved excellent in flavour as well as ornamental—from our British *G. compressa*; thus proving that our plant is quite as valuable for the table as its Indian cousin.

G. compressa has something the aspect of *G. confervoides*, but may always be known by its more succulent frond, and very different substance. It is as soft and brittle, as *G. confervoides* is hard and tenacious. It also bears some resemblance to the narrow variety of *G. multipartita*, but is more cylindrical, and of a different, and much brighter colour.

Fig. 1. Gracilaria compressa:—*the natural size.* 2. Section of a tubercle. 3. Tetraspores:—*both highly magnified.*

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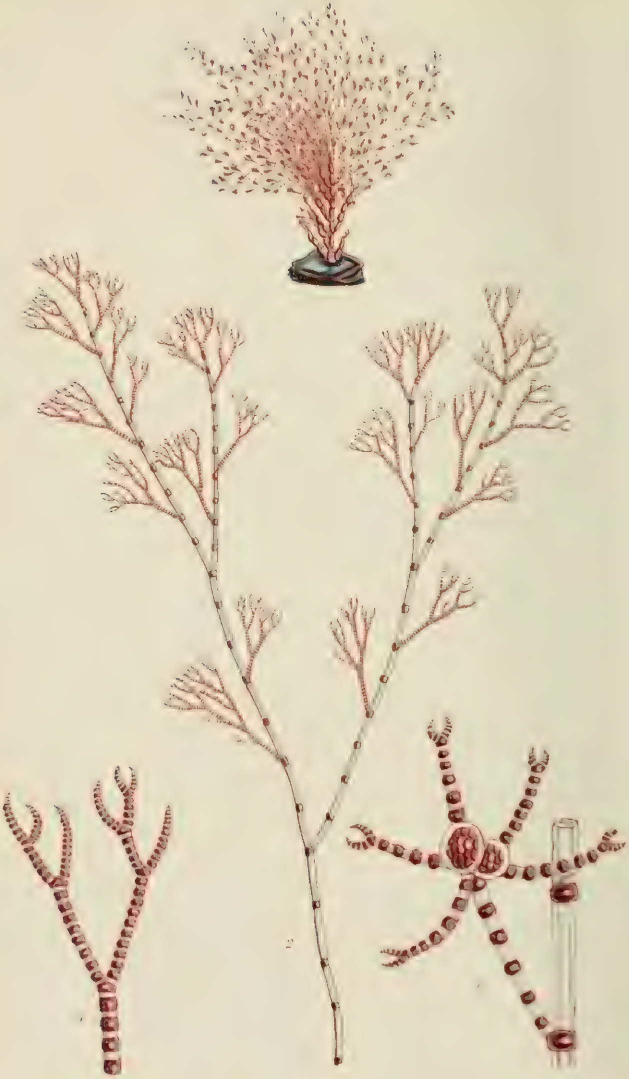

PLATE CCVI.

CERAMIUM GRACILLIMUM, *Griff. et Harv.*

GEN. CHAR. *Frond* filiform, one tubed, articulated; the dissepiments coated with a stratum of coloured cellules, which sometimes extend over the surface of the articulation. *Fructification* of two kinds, on distinct individuals; 1, *tetraspores* either immersed in the ramuli or more or less external; 2, sessile, roundish *receptacles (favellæ),* having a pellucid limbus, containing minute, angular spores, and subtended by one or more, short, involucral ramuli. CERAMIUM *(Roth.),*—from κεραμος, a *pitcher*; but the fruit is not pitcher shaped.

CERAMIUM *gracillimum*; frond excessively slender, of nearly equal diameter throughout, very flaccid and gelatinous, dichotomous; the branches set with minute, flabelliform, dichotomous ramuli; articulations colourless, those of the branches five or six times as long as broad, those of the ramuli very short; dissepiments opake, purple; favellæ borne on the lateral ramuli, with a spreading, many-rayed involucre.

CERAMIUM flaccidum, *Harv. in Herb.*

HORMOCERAS gracillimum, *Kütz. in Linn.* vol. xv. p. 733. *Kütz. Phyc. Gen.* p. 378.

HAB. On muscle shells and on *Corallina officinalis* and other small Algæ, exposed at extreme low-water. Annual. September. Kilkee, coast of Clare, *W.H.H.* (1844). Mewstone, Plymouth, *Rev. W. S. Hore* and *Dr. Cocks.* Penzance, *Mr. Ralfs.* Probably common.

GEOR. DISTR. Mediterranean Sea. Atlantic coast of France.

DESCR. *Fronds* densely tufted, two or three inches long, much more slender than a human hair, exceedingly flaccid and tender, irregularly dichotomous or somewhat alternately divided; the principal stem and branches of nearly equal diameter from their base to the extremity, the forkings distant. *Branches* furnished at intervals of one or two joints with minute, alternate, dichotomous, flabelliform ramuli, a line or two in length, obovate in outline and level topped. *Apices* incurved, but not strongly hooked. *Articulations* colourless; those of the lower part of the stem many times longer than broad, of the branches gradually shorter; and in the lateral dichotomous ramuli much shorter than their breadth, the terminal ones appearing like mere striæ. *Dissepiments* opake, purple, swollen. *Favellæ* either on lateral ramuli, or on truncated branches, binate, globose, surrounded by elongated, forked involucral ramuli. *Tetraspores,* I have not seen. *Substance* exceedingly tender and gelatinous, closely adhering to paper in drying. *Colour,* a dark, reddish purple.

I first met with this plant in the autumn of 1844, at Kilkee, on the west coast of Ireland. It covered a very large surface of rock, growing almost to the exclusion of every other species, both in places left bare at low water, and in the small tide-pools. In both situations it seemed to prefer the stunted fronds of *Corallina officinalis* for its habitat. It has a softer and more gelatinous substance than any British *Ceramium,* and this character, with its extreme tenuity, and the minute, fastigiate lateral branchlets, readily distinguish it from any of the section of the genus to which it belongs.

On communicating specimens to Professor Kützing, he informed me that they were identical with his *Hormoceras gracillimum* described four years previously. There can therefore be no confusion of synonyms in our adopting the species of the German author, whose specimens came from the Adriatic.

C. gracillimum is the smallest and most slender of our British *Ceramia.* So slender are its threads, so flaccid, and so densely crowded together, that it is almost impossible to display them properly on paper. They almost invariably become entangled together, and once this has occured, it is in vain to attempt their disentanglement.

Fig. 1. Tuft of CERAMIUM GRACILLIMUM, growing on Corallina officinalis; *the natural size.* 2. A branch. 3. A ramulus. 4. Pedunculated *Favella* with its involucre;—*all more or less highly magnified.*

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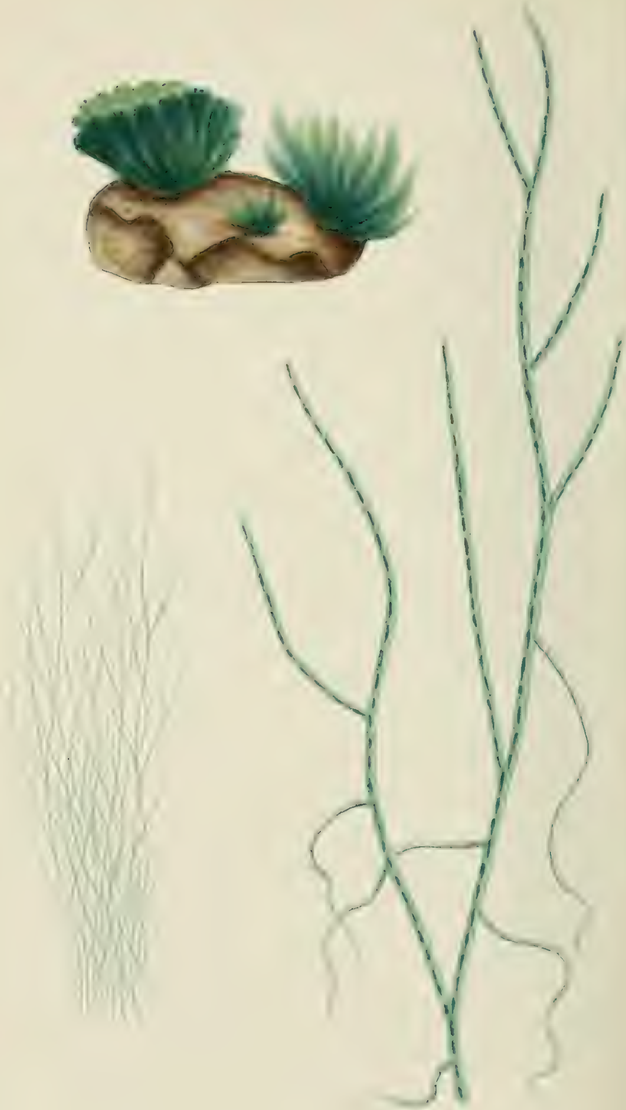

PLATE CCVII.

CLADOPHORA UNCIALIS, *Harv.*

GEN. CHAR. *Filaments* green, jointed, uniform, branched. *Fruit* aggregated granules or zoospores, contained in the joints, having at some period, a proper ciliary motion. CLADOPHORA (*Kütz.*)—from κλαδος, a *branch,* and φορεω, to *bear.*

CLADOPHORA *uncialis*: tufts very short, spongy, simple below, above divided into numerous fastigiate, woolly segments; filaments flexuous, sparingly branched, densely interwoven; ramuli distant, secund, long, patent, or incurved; articulations about twice as long as broad.

SPONGIOMORPHA uncialis, *Kütz. Phyc. Gen.* p. 273.

CONFERVA uncialis, *Fl. Dan.* t. 771. fig. 1. *Lyngb. Hyd. Dan.* p. 160. t. 56. *Ag. Syst.* p. 111. *Harv. in Hook. Journ. Bot.* vol. i. p. 304. *Wyatt, Alg. Danm.* no. 146. *Harv. Man.* p. 138.

HAB. On rocks, near low water mark. Annual. May. Torbay, *Mrs. Griffiths.* Falmouth bay, *Miss Warren.* St. Michael's Mount and Aberystwith, *Mr. Ralfs.* Jersey, *Miss White.* Newcastle, Downshire, *Mr. W. Thompson.* Rathlin, Antrim, *Mr. D. Moore.* Rocks beyond Kingstown, *Miss Ball.* Malbay and Balbriggan, *W. H. H.* Malahide, *Mr. M'Calla.* Orkney, *Messrs. Thomas* and *M'Bain.*

GEOGR. DISTR. Shores of Northern Europe.

DESCR. *Filaments* very slender, an inch or two in length, densely aggregated into spongy or rope-like tufts, forming a more or less definite compound frond, which is simple below and divided into several branches of about equal length, whose tops, therefore, standing on a level, produce a globular tuft. As the plant advances in age, the branches become less regular, and the tufts assume a woolly or shaggy aspect. *Filaments* irregularly and distantly branched, interwoven, and connected together by root-like fibres, which issue from the sides of the branches, take a downward direction, and coil round neighbouring filaments; *branches* curved, secund, simple, or with a few erect or subpatent, simple ramuli. *Articulations* pretty uniform, generally about twice as long as broad, filled with a fluid endochrome. *Colour,* a vivid green, discharged in fresh water, and very much faded in drying. *Substance* membranaceous, adhering to paper.

This plant was added to the British Flora by Mrs. Griffiths in the year 1833, and has been found abundantly in several places. It more nearly resembles *C. lanosa* than any other of our native species, and sometimes cannot be readily distinguished without a close examination; but it forms much more dense and spongy tufts, which finally become more intricately interwoven together;

and the apices are seldom so distinctly fastigiate as in that species. The habitat in which *C. uncialis* occurs, affords an additional clue. It usually frequents rocky places, growing on the rock itself, or among the thin coating of sand which covers it, in places close to the edge of low-water mark. *C. lanosa*, on the contrary, is almost always found as a parasite on other Algæ; or else attached to pieces of wood, and to the leaves of *Zostera*. To *C. arcta*, our *C. uncialis* has much resemblance; but is a much smaller plant, with very much more slender filaments.

The root-like fibres, by which the filaments are connected together, are common to the three species: and if these roots be considered a character of sufficient importance to define a *genus*, Kützing's *Spongiomorpha*, founded on the present plant, ought to include the three.

Fig. 1. Tufts of CLADOPHORA UNCIALIS:—*of the natural size*. 2. Filaments bundled together:—*moderately magnified*. 3. Portion of a filament:—*highly magnified*.

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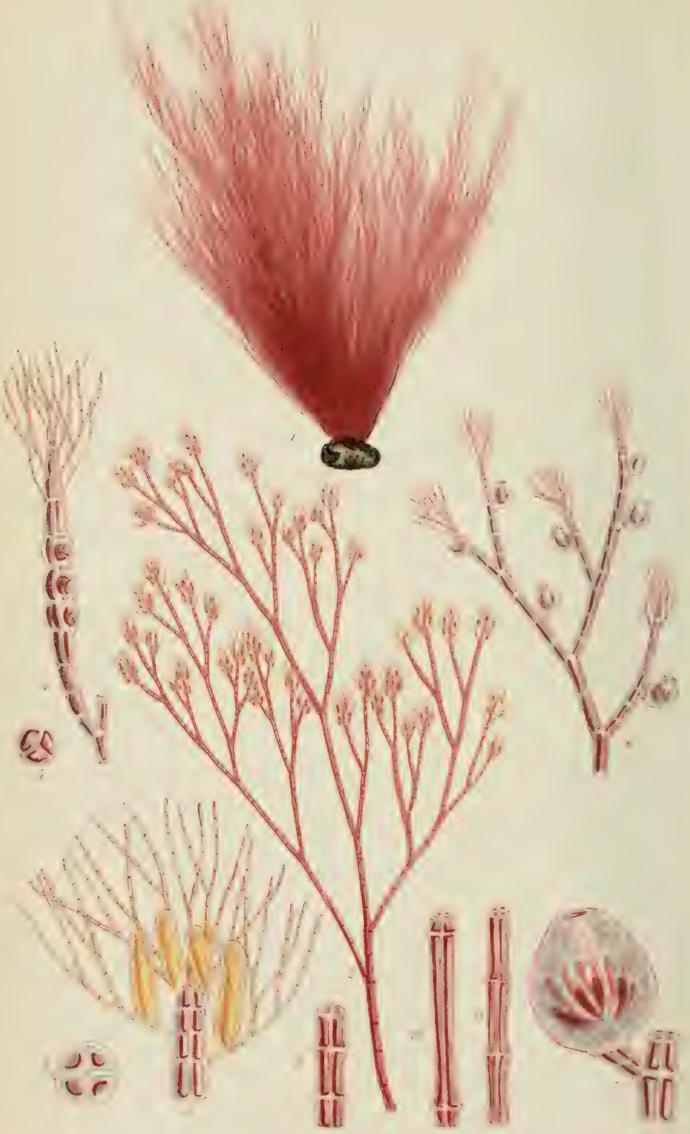

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Reeve Benham & Reeve imp.

Plate CCVIII.

POLYSIPHONIA FIBRATA, *Harv.*

Gen. Char. *Frond* filamentous, partially or generally articulate; joints longitudinally striate, composed of numerous radiating cells or tubes, disposed round a central cavity. *Fructification* twofold, on different individuals; 1, ovate capsules (*ceramidia*), furnished with a termina pore, and containing a tuft of pear-shaped *spores*; 2, *tetraspores* imbedded in swollen branchlets. Polysiphonia (*Grev.*) — from πολυς, *many*, and σιφων, a *tube*.

Polysiphonia *fibrata*; stems setaceous below, much attenuated upwards, flaccid, gelatinous, simple or alternately branched, bearing at greater or less distances, dichotomously divided, more or less pencilled ramuli, whose tips are fibrilliferous; axils patent; articulations bistriate, variable in length, those in the principal branches four to six times longer than broad; siphons four, surrounding a minute central cavity; capsules ovate, usually pedunculate.

Polysiphonia fibrata, *Harv. in Hook. Br. Fl.* vol. ii. p. 329. *Harv. in Mack. Fl. Hib.* part 3. p. 206. *Harv. Man.* p. 93. *Wyatt, Alg. Danm.* no. 39. *Kütz. Phyc. Gen.* p. 426. *Endl. 3rd Suppl.* p. 45.

Hutchinsia allochroa β. fibrata, *Ag. Syst.* p. 154.

Conferva fibrata, *Dillw. Conf. Syn.* p. 84. t. G.

Hab. On rocks, muscle shells, &c., near low water mark, either in tide-pools or exposed places. Annual. Summer and Autumn. Frequent on the British coasts.

Geogr. Distr. Atlantic shores of Europe.

Descr. *Root*, a mass of branched and matted fibres. *Fronds* very densely tufted, from two to six or eight inches in length, as thick as hogs' bristle at the base, gradually attenuated upwards to a capillary or byssoid fineness, irregularly dichotomous or alternately branched; branches more or less divided, either indefinitely decompound or bearing along their divisions lateral multifid ramuli, which sometimes are dense and pencilled, in other specimens more lax and simpler. *Articulations* visible throughout the whole plant; twice as long as broad below; six or eight times as long in the middle of the stem; three or four times in the upper branches; and scarcely twice as long as broad in the ramuli:—marked with two wide, coloured tubes, separated by narrow pellucid spaces. *Siphons* four, containing coloured bags, and surrounding a minute central cavity. *Apices* of the branches and ramuli terminating in a tuft of byssoid, dichotomous fibres. *Ceramidia* ovate, with a wide mouth, pedunculate, abundantly scattered over the upper branches, containing a tuft of pear-shaped spores. *Tetraspores* small, in distorted ramuli. *Antheridia* oblong, obtuse, yellow, growing from the apical fibres and clustered round the tips of the branches. *Colour*, a dark red-brown, sometimes becoming purple in drying; the colouring matter soon given out in fresh water, to which it imparts a rosy hue. *Substance* very tender and gelatinous, soon decomposing. *Odour* offensive.

The species here figured, originally defined by Mr. Dillwyn in the supplement to his work on the British Confervæ, appears to be well understood by most British botanists, who are sufficiently familiar with its characters from the excellent specimens published by Mrs. Wyatt. It is pretty generally dispersed on the British coasts, and must be regarded as one of our commonest species of *Polysiphonia*. I am not clear, however, that it is equally well understood on the continent, and have reason to believe that it is known in different places under several different names; but in the present state of our knowledge of the *Polysiphoniæ*, I have not ventured to bring together any supposed synonyms. The genus is a very extensive one—and its species put on, at different ages, a great variety of forms. These, if gathered isolated one from another, or by persons who are more desirous of recording novelties than of tracing out the true relations of vegetable forms, may often be made to pass for new species; while they would, if carefully watched in their place of growth, soon put on the peculiar characteristics of the type to which they belong. I know scarcely any genus in which more false species have been founded on imperfect specimens than *Polysiphonia*:—and this is saying much in the present day, in which the practice has been so largely indulged in, in almost every department of botany;—but especially among cellular plants.

The dichotomous fibres which terminate the branches of our *P. fibrata*, and which have given it its name, are by no means peculiar to it; but are equally characteristic of the young state of most, if not all, the species of the genus. On some they are found more abundant and more fully developed than on others, and in the present plant this is remarkably the case. It is to these fibres the *antheridia* are attached, which on *P. fibrata* are frequently in great abundance, crowning every branchlet with a tuft of golden fruit.

Fig. 1. Tuft of POLYSIPHONIA FIBRATA:—*the natural size*. 2. A branch bearing antheridia. 3. Apical fibres and antheridia. 4. A ramulus with imbedded tetraspores. 5. Tetraspore. 6. Ramuli with ceramidia. 7. A ceramidium. 8. Transverse section of the frond. 9. Articulations from the lower part of the stem: 10, from the middle: 11, from the upper part:—*all more or less magnified*.

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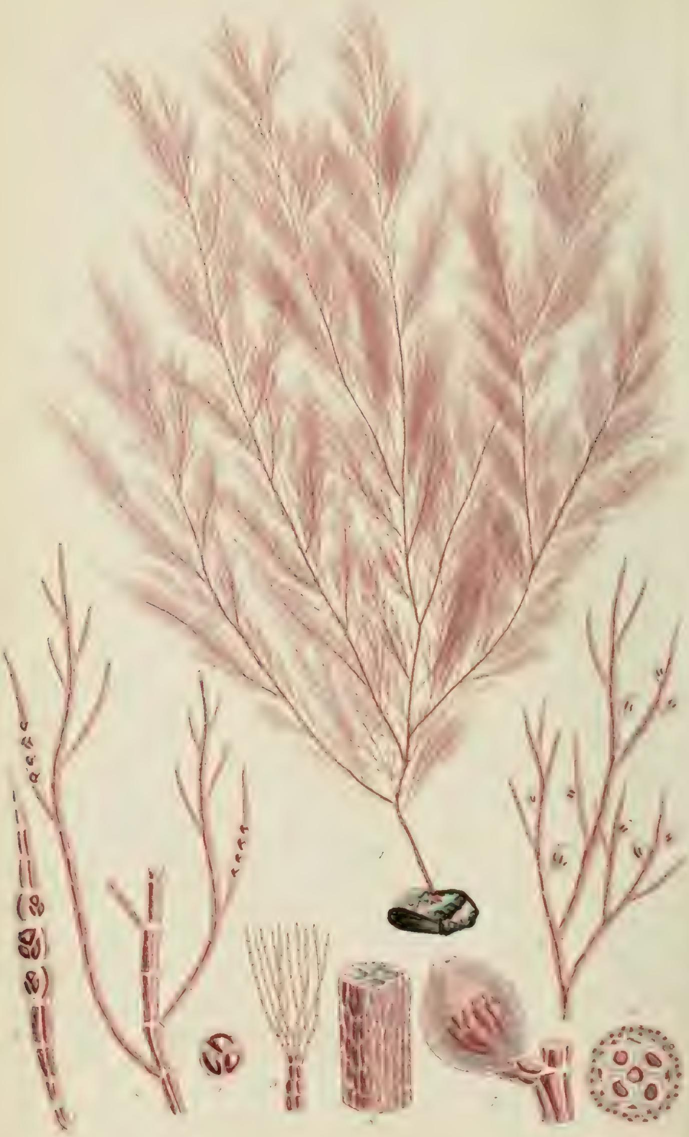

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PLATE CCIX.

POLYSIPHONIA VIOLACEA, *Grev.*

GEN. CHAR. *Frond* filamentous, partially or generally articulate; joints longitudinally striate, composed of numerous radiating cells or tubes, disposed round a central cavity. *Fructification* two-fold, on different individuals; 1, ovate *capsules* (*ceramidia*), furnished with a terminal pore and containing a tuft of pear-shaped spores; 2, *tetraspores,* imbedded in swollen branchlets. POLYSIPHONIA (*Grev.*)—from *πολυς, many,* and *σιφων,* a *tube.*

POLYSIPHONIA *violacea*; brownish red or purple; stem inarticulate, marked with irregular cells, rather robust, alternately branched; branches quadrifarious, decomposed, bushy or feathery, the ultimate ramuli exceedingly slender, alternately multifid, fibrilliferous; articulations of the ramuli bi-striate, two to four times longer than broad; siphons four; capsules ovate, pedicellate or sessile; tetraspores in swollen, sub-moniliform ramuli.

POLYSIPHONIA violacea, *Grev.—Wyatt, Alg. Danm.* no. 176. *Harv. Man.* p. 92 (*not of Harv. in Brit. Fl.* vol. ii. p. 332). *Kütz. Phyc. Gen.* p. 421. (no. 34) and p. 426 (no. 74). *Endl. 3rd Suppl.* p. 46.

HUTCHINSIA violacea, *Ag. Syn.* p. 54. *Lyngb. Hyd. Dan.* p. 112. t. 35 (*quoad partem*) f. B. *Ag. Syst.* p. 150. *Ag. Sp. Alg.* vol. ii. p. 76.

HAB. On rocks and stones, and on the smaller Algæ, near low water mark. Annual. May and June. Not uncommon. Torbay, *Mrs. Griffiths.* Salcombe, *Mrs. Wyatt.* Falmouth Harbour, *Miss Warren.* Most abundant at Carnarvon, *Mr. Ralfs.* Beggar's Island, Plymouth, *Mr. Rohloff.* Belfast Lough, *Dr. Drummond.* Roundstone, *Mr. M'Calla.* Howth, *Miss Gower.* Ferriter's Cove, Kerry, *Mr. Andrews.*

GEOGR. DISTR. Shores of Northern Europe generally.

DESCR. *Root,* a small disc. *Fronds* from six to ten inches long or more, with a principal stem which varies in diameter from the thickness of a hog's bristle to twice that thickness, and is divided in an irregularly alternate manner. *Branches* quadrifarious, repeatedly compounded, till there results a bushy or feathery, closely branched frond, each division of which becomes more and more slender and flaccid, and the whole at length terminates in an abundance of slender capillary ramuli, which are long and subsimple, sparingly branched near the top, and generally terminated by a tuft of byssoid fibres. *Stem* and principal branches inarticulate, their siphons being coated externally with a thick stratum of irregular cells. *Ramuli* articulate; the articulations two-tubed, the lower ones four times, the upper twice as long as broad. *Ceramidia* ovate, abundant on the ramuli, frequently pedunculate. *Tetraspores* imbedded in swollen ramuli, roundish. *Colour,* brown red, more or less purple, and frequently assuming a fine purple shade on drying, after immersion in fresh water. *Substance* very tender and soft, cartilaginous in the stem and branches, gelatinous in the ramuli, closely adhering to paper.

A very beautiful species, in many respects resembling *P. fibrata*, especially in the appearance that small portions present to the microscope; but this is a much larger and finer growing plant, and readily and clearly distinguished by the opake stem, coated with short, irregular cells. In some specimens the byssoid ramuli are much developed, and of a beautiful violet colour, especially when dried; in others they are far shorter, and the frond has a more bushy appearance. In a young state the tips are found clothed with fibres, but these are rarely seen in the more advanced stages of growth.

From *P. Brodiæi*, to which luxuriant specimens bear much resemblance, *P. violacea* is at once known by the fewer number of tubes in the stem; the siphons in that species being seven in number, whereas in this there are but four.

The species called *P. violacea* in the British Flora, on the authority of Carmichael, is very different from the present; but so near *P. nigrescens* in its essential characters that I am now disposed to regard it as merely a variety of that species. I had at one time kept it distinct under the name of *purpurascens*. Every one acquainted with *P. nigrescens* must know that it puts on a great variety of shapes, and the state formerly called *violacea* differs from the usual forms in being of a brighter and more purple colour, with greater delicacy of ramification.

Our present *P. violacea* was first detected as British by Mrs. Griffiths, and ascertained to be identical with the plant of continental authors by Professor J. Agardh, who inspected the specimens published in the early copies of Mrs. Wyatt's books. It has been found on most of our coasts, and is probably distributed round the shores of the British Isles.

Fig. 1. Polysiphonia violacea:—*the natural size.* 2. Ramuli with *tetraspores.* 3. Ramulus removed. 4. A tetraspore. 5. Fibrilliferous apex. 6. Ramuli with *capsules.* 7. A capsule. 8. Portion of the stem, to show its surface cells. 9. Transverse section of the stem, to show the siphons.

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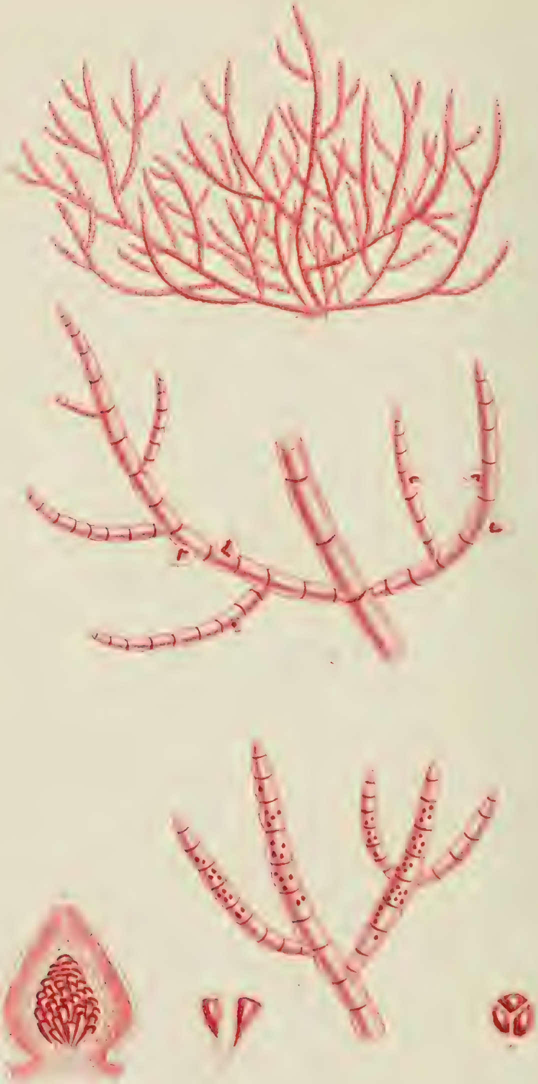

Reeve Benham & Reeve imp.

PLATE CCX.

CHYLOCLADIA PARVULA, *Hook.*

GEN. CHAR. *Frond* (at least the branches) tubular, constricted at regular intervals, and divided by internal diaphragms into joints, filled with a watery juice, and traversed by a few longitudinal filaments; periphery composed of small, polygonal cells. *Fructification* of two kinds, on distinct individuals; 1, spherical, ovate, or conical *capsules* (*ceramidia*) containing a tuft of wedge-shaped spores on a central placenta; 2, tripartite *tetraspores*, immersed in the smaller branches, near their apices. CHYLOCLADIA (*Grev.*) — from χυλος, *juice*, and κλαδος, a *branch*.

CHYLOCLADIA *parvula*; frond subgelatinous, slender, bushy, irregularly branched; ramuli scattered; branches constricted at intervals of (nearly) equal length and breadth; ceramidia conical, with a prominent orifice.

CHYLOCLADIA parvula, *Hook. Br. Fl.* vol. ii. p. 298. *Wyatt, Alg. Danm.* n. 72. *Harv. in Mack. Fl. Hib.* part 3. p. 199. *Harv. Man.* p. 72. *J. Ag. Alg. Medit.* p. 111.

GASTRIDIUM parvulum, *Grev. Alg. Brit.* p. 119.

LOMENTARIA parvula, *Zanard. Syn. Alg. Adr.* p. 99. *Mont. Pol. Sud. Crypt.* p. 123. *Endl. 3rd Suppl.* p. 43. *Kütz. Phyc. Gen.* p. 331.

CHONDRIA parvula, *Ag. Syst. Alg.* p. 207.

FUCUS kaliformis, *var.* γ. nanus, *Turn. Hist.* vol. i. p. 61.

HAB. Parasitical on the smaller Algæ, in tide-pools, near low water mark.

GEOGR. DISTR. Atlantic shores of Southern Europe and North America. Mediterranean Sea.

DESCR. *Root* composed of branched and matted fibres. *Fronds* three or four inches long, very densely crowded together, forming globular, intricate, bushy tufts, whose branches spread in all directions. *Stem* subsimple or irregularly forked, sometimes much divided, furnished with scattered, more or less crowded, alternate or opposite, occasionally whorled branches, as long as itself and very patent. *Branches* curved, more or less divided, and set with numerous scattered, patent or horizontal, obtuse ramuli, of nearly equal diameter with the parts they spring from. *Articulations* of the stem and main branches of uncertain length, and occasionally imperfectly defined; those of the branches and ramuli pretty constantly as long as broad, or once and a half as long, contracted at the dissepiments. *Ceramidia* prominent, sessile on the branches, ovate or conical, with a prominent orifice, and containing a dense and very darkly coloured mass of tufted, obconical spores. *Tetraspores* minute, triparted, abundantly scattered through the lesser branches and ramuli. *Colour*, a pinky or dull red, changing in fresh water; but when the plant grows in a sunny situation the whole frond, except the tips and the masses of spores, becomes of a greenish yellow. *Substance* gelatinous and tender, closely adhering to paper in drying.

This plant, in many of its characters, resembles the smaller specimens of *C. kaliformis*, of which it was formerly considered to be merely a dwarf variety. But it may generally be known from all states of that species by its peculiarly bushy, dense habit, and the alternate disposition of its branches and ramuli; and when found in fructification the two are clearly distinguished by the different form of the capsular fruit. The ceramidia of *C. kaliformis* are hemispherical; those of *C. parvula* are of much larger size, less abundant, and distinctly conical, with a much less evident hyaline border. In the present species also, the articulations of the branches are shorter and more equal than in *C. kaliformis*; and those of the main stems never so much distended, nor of so great a proportionate length.

Chylocladia parvula is found on most of our coasts, and appears frequent along the Atlantic and Mediterranean shores of Europe. Along the eastern shore of North America it would seem to be particularly abundant, as it occurs in almost every parcel of Algæ which I have received from that country. The American specimens agree in all essential particulars with the European; but some are much more slender, while others are more robust than the generality of British individuals. But there is quite as much difference observable among the latter as in any of the American forms.

A species found at New Zealand (*C. affinis*, Hook. et Harv.) seems almost intermediate between *C. kaliformis* and *C. parvula*, having much of the ramification of one, with the fructification of the other; but it is sufficiently distinct from both.

Fig. 1. CHYLOCLADIA PARVULA:—*the natural size*. 2. Branchlets with ceramidia. 3. Section of a *ceramidium*. 4. Spores from the same. 5. Branchlets with tetraspores. 6. A tetraspore:—*all more or less magnified.*

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CCXI.

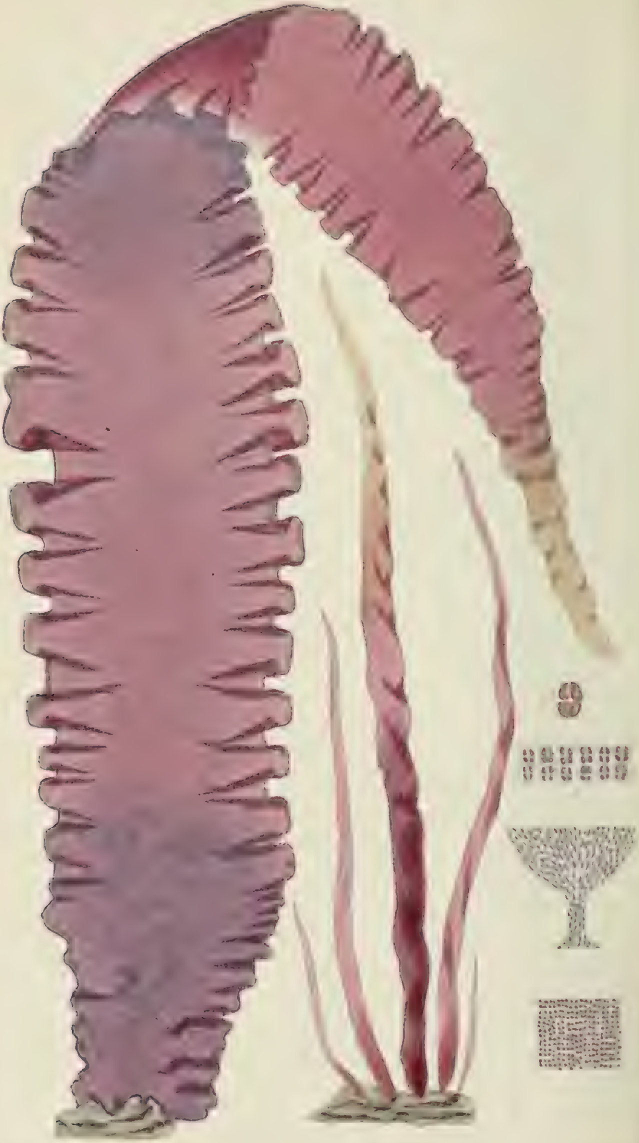

PLATE CCXI.

PORPHYRA VULGARIS, *Ag.*

GEN. CHAR. *Frond* delicately membranaceous, flat, purple. *Fructification,* granules, arranged in fours, scattered over the whole frond; also "scattered sori of oval spores." PORPHYRA (*Ag.*),—from πορφυρος, *purple.*

PORPHYRA *vulgaris*; frond simple, lanceolate, entire, the margin more or less waved.

PORPHYRA vulgaris, *Ag. Aufz.* p. 18. *Grev. Alg. Brit.* p. 169. *Hook. Br. Fl.* vol. ii. p. 310. *Wyatt, Alg. Danm.* n. 32. *Harv. in Mack. Fl. Hib.* part 3. p. 241. *Harv. Man.* p. 169. *Hook. fil. Fl. Antarct.* vol. ii. p. 500. *Kütz. Phyc. Gen.* p. 382. *Endl. 3rd. Supp.* p. 19.

PORPHYRA purpurea, *Ag. Syst. Alg.* p. 191.

PORPHYRA linearis, *Grev. Alg. Brit.* p. 170. t. 18. *Hook. Br. Fl.* vol. ii. p. 310. *Harv. in Mack. Fl. Hib.* part 3. p. 241. *Harv. Man.* p. 170. *Wyatt, Alg. Danm.* n. 163. *Endl. 3rd. Supp.* p. 19,

ULVA purpurea, *Roth, Cat. Bot.* vol. i. p. 209. t. 6. *Lyngb. Hyd. Dan.* p. 29. *Ag. Sp. Alg.* vol. i. p. 405.

HAB. On rocks and stones between tide-marks. Annual. Nearly throughout the year. Abundant on the British shores.

GEOGR. DISTR. Throughout the Atlantic Ocean, from the Færoe Islands to Cape Horn. Kerguelen's Land.

DESCR. *Root*, a minute disc. *Fronds* from one to two feet long, and from one or two lines to two or three inches in width, perfectly simple, lanceolate or linear, tapering much at the extremity, at first ovate at the base, afterwards more or less cordate, rising from a very minute linear stipe. In the narrower varieties the margin is nearly flat, and even; in the broader it is very much waved, but scarcely sinuous. *Fructifications* elliptical dark-purple granules, arranged in fours, dispersed through all the cells of the frond; and also "irregular scattered sori of larger, ovate granules, mostly situate near the base." (*Grev.*) *Substance* very thin and membranaceous, very glossy, shrinking much in drying and only imperfectly adhering to paper. *Structure* cellular; the frond composed of a double stratum of quadrate cells. *Colour* (owing to fructification) a more or less vivid purple.

This is distinguished from *P. laciniata*, already figured at our Plate XCII., by being perfectly simple at all ages, instead of being irregularly cloven; and by the much greater length of the frond in proportion to its breadth. Both are equally common, and widely dispersed over the world, and both indifferently may be used in the preparation of marine-sauce or *Laver*. The subject of our present plate is the more beautiful of the two, being commonly of a much brighter colour than its congener, but like it, the brilliancy varies according to the forwardness of the fructification.

It will be seen, by reference to the plate, and synonyms quoted, that I propose to reduce the *P. linearis* of British authors to its original place as a narrow variety of *P. vulgaris*. It was originally separated by Dr. Greville in his Algæ Britannicæ, and this separation has been adopted in subsequent British works, though in the Manual I have expressed doubts of the validity of the supposed new species. When gathered in early winter, as in the month of November, it appears sufficiently distinct. Wide spaces of rock will be found clothed with narrow purple ribbons, as flat and free from undulations and as ovate at the base, with as distinct a stipes as are represented in figures 2 and 3. But two or three months later a considerable change will have taken place in the plants, their margins will be more uneven and their bases less ovate; and by the end of spring, it will be difficult to trace in the plants which will then cover the rocks the slender ribbons of winter. I admit that there are localities, very near high-water mark, where the frond never attains any great length or breadth, and therefore remains more true to the name *linearis*, but this stunted growth is clearly referable to deficient nourishment. Where the plant grows in deeper water the fronds gradually develope into the broad state represented at fig. 1. This figure represents but a small specimen; the frond is often two feet in length.

I am not acquainted with *P. amethystea*, Kütz., founded on a specimen collected by Mr. Shuttleworth on the Irish coast. Can it be merely a state of *P. vulgaris*?

Fig. 1. PORPHYRA VULGARIS. 2. Narrow state of the same, the *P. linearis* of authors;—*both of the natural size*. 3. Base of young frond. 4. Portion of surface, in fruit. 5. Vertical section of frond. 6. Tetraspore.

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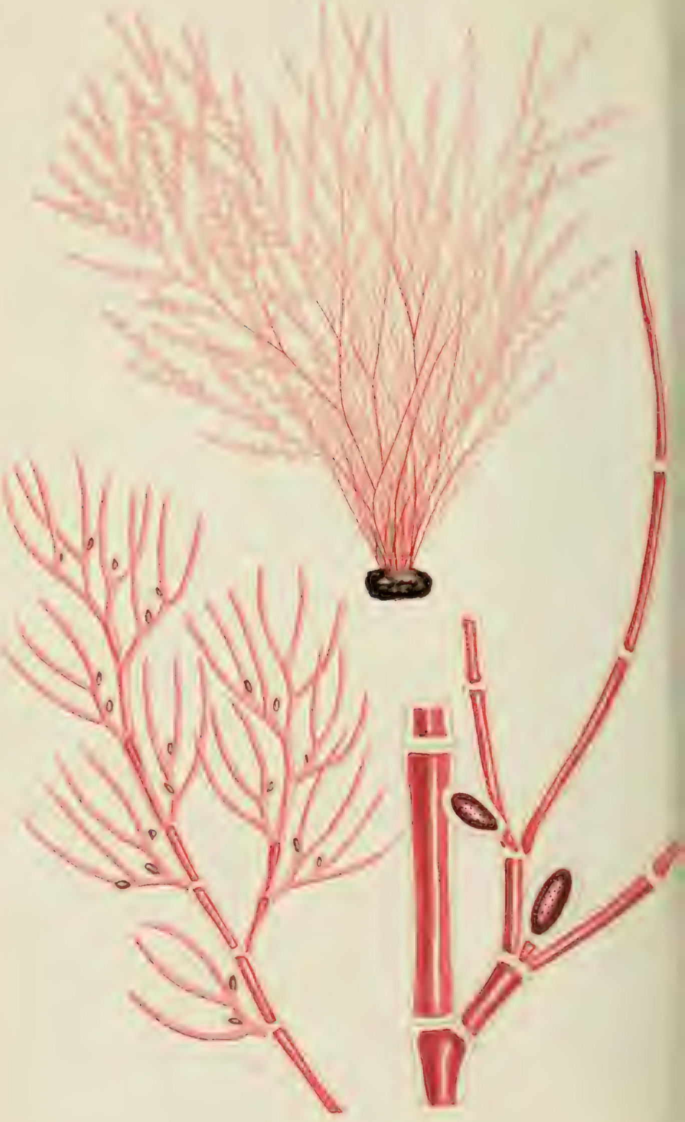

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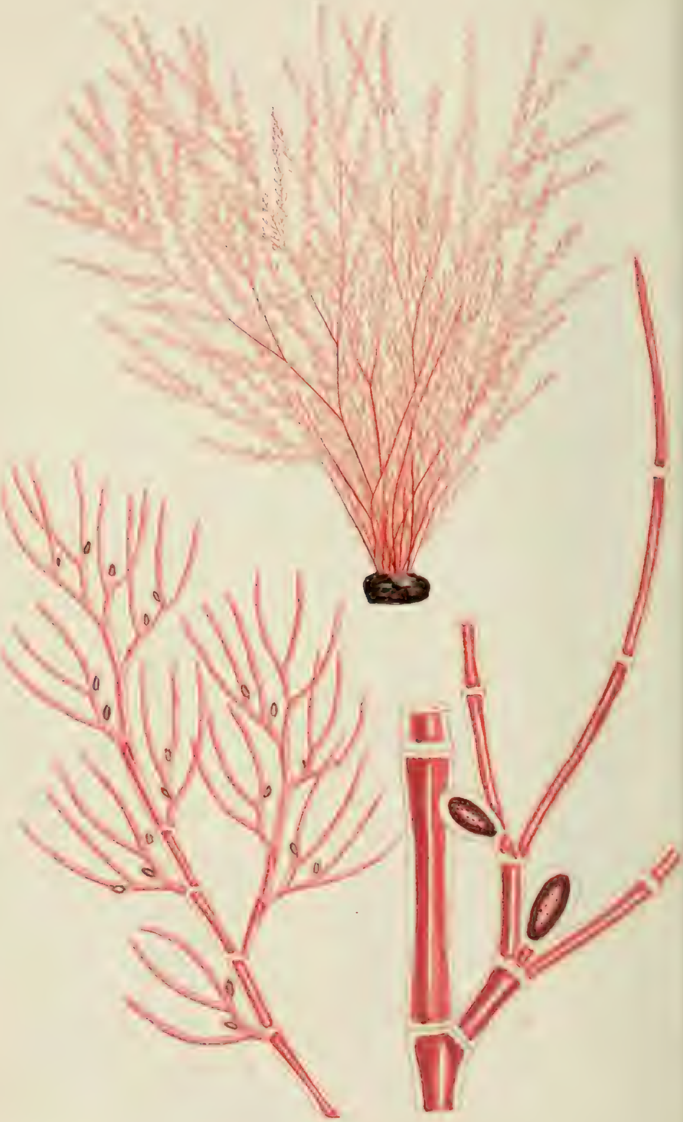

PLATE CCXII.

CALLITHAMNION PEDICELLATUM, *Ag.*

GEN. CHAR. *Frond* rosy or brownish-red, filamentous, stem either opake and cellular, or translucent and jointed; branches jointed, one-tubed, mostly pinnate (rarely dichotomous or irregular); dissepiments hyaline. *Fruit* of two kinds, on distinct plants; 1, external tetraspores, scattered along the ultimate branchlets, or borne on little pedicels; 2, roundish or lobed, berry-like receptacles (*favellæ*), seated on the main branches, and containing numerous, angular spores. CALLITHAMNION (*Lyngb.*),—from καλος, *beautiful*, and θαμνιον, a *little shrub.*

CALLITHAMNION *pedicellatum*; stems setaceous, pellucid, jointed, loosely and irregularly divided; branches furnished with short, alternate, sparingly dichotomous ramuli; apices very obtuse; articulations variable, mostly very long; tetraspores(?) solitary, elliptical or pear-shaped, axillary, stalked.

CALLITHAMNION pedicellatum, *Ag. Sp. Alg.* vol. ii. p. 174. *Harv. in Hook. Fl. Brit.* vol. ii. p. 347. *Harv. in Mack. Fl. Hib.* part 3. p. 217. *Harv. Man.* p. 114. *Wyatt, Alg. Damn.* no. 94. *J. Ag. Alg. Medit.* p. 73. *Kütz. Phyc. Gen.* p. 371. *Endl. 3rd. Supp.* p. 34.

CALLITHAMNION clavatum, *Ag. Sp. Alg.* vol. ii. p. 180. *J. Ag. Alg. Medit.* p. 73. *Kütz. Phyc. Gen.* p. 371. *Mont. An. Sc. Nat.* 1839. p. 166. *Endl. 3rd, Supp.* p. 34.

CALLITHAMNION Perreymondii, *Duby. Mem.* vol. ii. t. 4. f. 5.

CALLITHAMNION botryticum, *De Not.* (fide Lenorm.)

GRIFFITHSIA irregularis, *Kütz. Actien*, 1836.

CERAMIUM pedicellatum, *Ag. Syst.* p. 137.

CERAMIUM clavægerum, *Bonn. Hyd. loc. in An. Mus. Par.* 1825. p. 90.

CONFERVA pedicellata, *E. Bot.* t. 1817. *Dillw. Conf.* t. 108.

HAB. On rocks and wood-work, near low-water mark, mostly in deep rock-pools; sometimes dredged in from 4–7 fathoms. Rather rare, but found all round the coast. Annual. Summer. Brighton, *Mr. Borrer.* Torbay &c., *Mrs. Griffiths.* Sidmouth, *Miss Cutler.* Falmouth Bay, *Miss Warren.* Salcombe, Carnarvon, and Milford Harbour, *Mr. Ralfs.* Jersey, *Miss White* and *Miss Turner.* Bantry Bay, *Miss Hutchins.* Malbay, Valentia, and Wicklow, *W.H.H.* Portaferry and Bangor, Belfast Bay, *Mr. W. Thompson.* Roundstone, *Mr. M^c Calla.* Ferriter's Cove, *Mr. W. Andrews.* Howth, *Miss Gower.* Orkney, *Rev. J. Pollexfen.* Dredged in Calf Sound, in seven fathoms, *Messrs. Thomas and M^c Bain.* Saltcoats and Ardrossan (on the pier), *Rev. D. Landsborough.*

GEOGR. DISTR. Atlantic shores of France. Mediterranean Sea.

DESCR. *Root* discoid, or somewhat fibrous. *Fronds* densely tufted, from two to six or eight inches high, as thick as hogs' bristles, irregularly divided in a manner between alternate and dichotomous; branches sometimes nearly simple, long and virgate, sometimes repeatedly branched, and somewhat flabellate, more or less fastigiate, seldom quite naked, generally furnished at each joint with short, forked, or twice or thrice dichotomous, alternate ramuli. Ultimate divisions of the forked ramuli often incurved, cylindrical.

of several joints, very obtuse. *Stems* articulated at the base, the articulations free of veins, with a wide limb and a more or less contracted endochrome, the dissepiments pellucid. *Articulations* variable in different specimens, sometimes only three or four times longer than broad, but more commonly ten or twelve times. *Tetraspores* (?) elliptical or pear-shaped, dark-coloured, with a wide border, and containing a dense, undivided mass of endochrome. These bodies are borne on short pedicels, consisting of a single cell, in the axils of the ultimate ramuli; each fructification being formed out of the central *bud* of a trifid branch, and thus cymose. *Favellæ* unknown. *Substance*, when freshly gathered, somewhat crisp; soon becoming flaccid. *Colour*, a clear pinky red, rapidly changing in fresh water, and becoming brownish in drying, often staining the paper brown. It closely adheres to paper in drying.

Originally discovered on the Sussex coast, by Mr. Borrer, and long considered a rarity, this beautiful plant has now been found to grow in so many places that I might perhaps have spared myself the transcription of the various habitats mentioned above, and substituted the statement that it is not very uncommon, and is generally distributed round the British coasts. I have not seen any specimens from the east of England, and it is certainly rare in the north, and in Scotland. On the south coast of England, and south and west of Ireland it is by no means rare, and the individual specimens are often of large size. It is common on the shores of France, and in the Mediterranean, where its different varieties, as I regard them, are ennobled to the rank of species by most continental botanists.

M. Montagne in a memoir on *Cal. clavatum*, published in the Annales des Sciences Naturelles, refers the *Conf. pedicellata* of Dillwyn to that species, retaining, of course, the name *pedicellatum* to the plant described in Eng. Botany, and which he regards as a different species. I possess fragments of Mr. Borrer's original specimen figured in English Botany; and have examined those collected by Miss Hutchins from which Dillwyn's plate, copied from a beautiful drawing by that lady, was engraved; and having compared these together, and contrasted them with a great number of specimens from various localities, I am not disposed to alter the opinion which I formerly expressed of their identity. M. Montagne is, no doubt, correct in referring Dillwyn's plant to the *C. clavatum* of Agardh.

Among the many forms which this plant puts on, I possess one gathered by Mr. Ralfs at Salcombe, which is remarkable for extremely squarrose ramuli and spreading branches.

Fig. 1. CALLITHAMNION PEDICELLATUM; tuft :— *of the natural size.* 2. Apex of a branch, with ramuli. 3. Portion of branch, ramulus and fruit :—*both magnified.*

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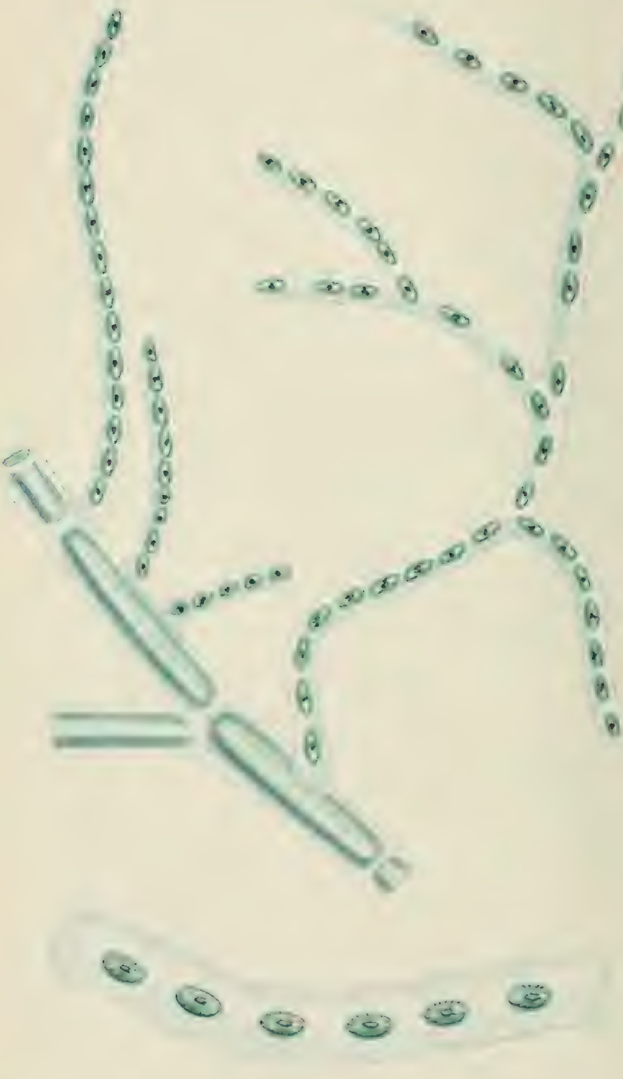

PLATE CCXIII.

HORMOSPORA RAMOSA, *Thw.*

GEN. CHAR. *Filaments* gelatinous, confervoid, each enclosing a linear series of oval or spherical cells. *Endochrome* green. *Fructification*: cells of the filaments enlarged and become converted into spores. HORMOSPORA (*Brébisson*),—from ὁρμος, a *necklace*, and σπορα, a *seed*.

HORMOSPORA *ramosa*; filaments branched; endochrome radiated.

HAB. Growing attached to the filaments of *Cladophora fracta* in a salt-water lake near Wareham, Dorsetshire. August and September. *Rev. W. Smith.*

DESCR. *Filaments* gelatinous, irregularly branched. *Cells* at first subcylindrical and closely coherent; subsequently becoming ovate and distinct. *Endochrome* pale green, radiating from a central nucleus. Filaments at length resolved into separate spores, each of which is surrounded by a considerable amount of gelatine.

This pretty species bears a considerable resemblance to *Hormospora mutabilis*, Brébisson; it differs, however, in its filaments being branched instead of being simple as in that species. In *H. mutabilis* the young cells are described as being subspherical, and the endochrome is stated to be lamellose; whereas in the present species the endochrome is radiated, and the immature cells are nearly cylindrical. *H. mutabilis* occurs in fresh-water ponds; whilst this inhabits a salt-water lake, to which the sea has access occasionally.

The filaments of *H. ramosa* when young are not unlike those of a *Sphæroplea*, between which genus and the *Palmelleæ*, *Hormospora* would seen to form a connecting link.

[I am indebted to my friend G. H. K. Thwaites, Esq., of Bristol, for the drawing and description here given. The genus *Hormospora* was first proposed by M. Brébisson in the year 1840, and a further account accompanied by figures of two species, both natives of stagnant fresh water, has been given by that accomplished naturalist, in the Annales des Sciences Naturelles for January, 1844. The species now described is the first yet noticed in salt water. Though not actually a *marine* plant, it has as much claim to a place in this work as some others already introduced, and I have pleasure in introducing the genus to British botanists. I should mention that the *Hormospora mutabilis,* stated to have been found by Mr. M‘ Ivor, proves on a more careful examination to be an animal substance.—*W.H.H.*]

Fig. 1. Young and mature filaments of HORMOSPORA RAMOSA, growing upon *Cladophora fracta.* 2. Cells become converted into spores:—*all highly magnified (about* 300 *linear.)*

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Plate CCXIV.

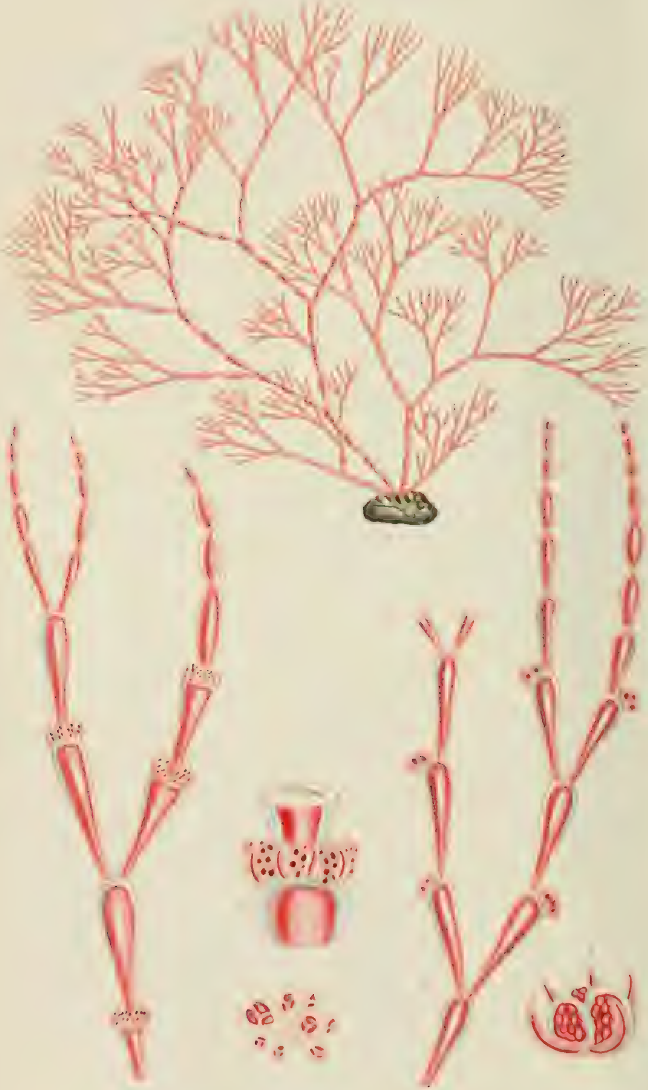

PLATE CCXIV.

GRIFFITHSIA CORALLINA, *Ag.*

GEN. CHAR. *Frond* rose-red, filamentous; filaments jointed throughout, mostly dichotomous; ramuli single tubed; dissepiments hyaline. *Fructification* of two kinds on distinct individuals; 1, *tetraspores* affixed to whorled involucral ramuli; 2, gelatinous *receptacles* (*favellæ*), surrounded by an involucre, and containing a mass of minute, angular spores. GRIFFITHSIA (*Ag.*),—in honour of *Mrs. Griffiths*, the most distinguished of British Algologists.

GRIFFITHSIA *corallina*; filaments dichotomous, incrassated, gelatinous; axils patent; joints swollen upwards, pear-shaped, the ultimate ellipsoid; involucres sessile, those containing tetraspores whorled round the branch, those containing favellæ lateral.

GRIFFITHSIA corallina, *Ag. Syn.* p. 28. *Hook. Fl. Scot.* part 2. p. 84. *Ag., Syst.* p. 145. *Ag. Sp. Alg.* vol. ii. p. 127. *Harv. in Hook. Br. Fl.* vol. ii. p. 338. *Harv. in Mack. Fl. Hib.* part 3. p. 212. *Harv. Man.* p. 103. *Wyatt, Alg. Danm.* no. 89. *Kütz. Phyc. Gen.* p. 374. *Endl. 3rd. Supp.* p. 35.

CALLITHAMNION corallinum, *Lyngb. Hyd. Dan.* p. 126.

CONFERVA corallina, *Linn. Sp. Pl.* p. 1636. *Lightf. Scot.* p. 988. *With.* vol. iv. p. 136. *Mohr. Isl.* p. 250. *Roth. Cat. Bot.* vol. iii. p. 225. *Dillw. Conf.* t. 98. *E. Bot.* t. 1825.

CONFERVA corallinoides, *Linn. Sp. Pl.* ed. i. p. 1166. *Huds. Fl. Ang.* p. 598.

CONFERVA geniculata, *Ellis, in Phil. Trans.* vol. lvii. p. 425. t. 18. fig. F. f.

CONFERVA marina gelatinosa, corallinæ instar geniculata crassior, *Dill. Musc.* vol. xxxiii. t. 6. f. 36.

HAB. On rocks near low-water mark, generally in deep pools. Annual. Summer. Not uncommon on the British shores from Orkney to Cornwall.

GEOGR. DISTR. Atlantic and Mediterranean shores of Europe. Færoe Islands. Iceland. North America. Tasmania.

DESCR. *Root* discoid. *Fronds* tufted, from two to six or eight inches in length, thicker than hogs' bristles, repeatedly and pretty regularly dichotomous, fastigiate; the lesser branches more irregular, often alternate, slenderer than the rest of the frond, and tapering to a point. *Axils* in the lower part of the frond very wide, in the upper more and more narrow. *Articulations* two to four times longer than broad, more or less swollen upwards, those near the base of the stems somewhat cylindrical, those of the medial portions regularly pear-shaped, narrow at their lower extremity, and very wide above; the uppermost elliptical, connected in moniliform strings. *Dissepiments* hyaline and, as well as the border of the articulation, broad. *Fructification*: 1, *tetraspores* densely clustered in whorls round the joints, and surrounded by an involucre of short ramuli, very unequal in size, small and large growing from the same point, attenuated at the base into a slender stalk; *favellæ* two or three together, sessile at the apex of an articulation, lateral, occupying the place of a suppressed branch of the stem, surrounded by short ramuli; each containing numerous ellipsoid granules. *Colour* a fine rosy crimson, freely given out in fresh water. *Substance* gelatinous and lubricous, closely adhering to paper in drying. *Smell* strong and peculiarly disagreeable.

This is one of those beautiful and not very uncommon plants which can scarcely fail to attract the notice of the observer who has once made the marine flora his study. We consequently find it among the species which soonest attracted notice. It is one of the few marine *Confervæ* figured by Dillenius, and having a place in the early editions of Linnæus. The clear red of its glossy, beaded fronds is well expressed in the specific name *corallina*, bestowed on it from an early period.

Few of our *Ceramieæ* have a wider range than *Griffithsia corallina*. It is found in every part of the European waters from the shores of Iceland to those of Italy, and I have received magnificent specimens from the shores of Van Dieman's Land. These last are so much larger and stronger than the majority of British grown fronds, that I at one time considered them distinct, and described them under the name *G. flabelliformis*; but on comparing them afresh with a suite of specimens, and especially with some very fine ones from the West of Ireland, I find that the distinctions formerly insisted on cannot be maintained. A considerable difference in the amount of upward-swelling of the joints exists in different specimens. This character is generally more developed in the larger than in the small individuals.

Fig. 1. GRIFFITHSIA CORALLINA:—*of the natural size*. 2. Portion of a branch with tetraspore-involucres. 3. One of the involucres. 4. Tetraspores. 5. Portion of a branch with favellæ. 6. Favellæ, with involucral ramuli:—*all more or less magnified.*

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Plate CCVII

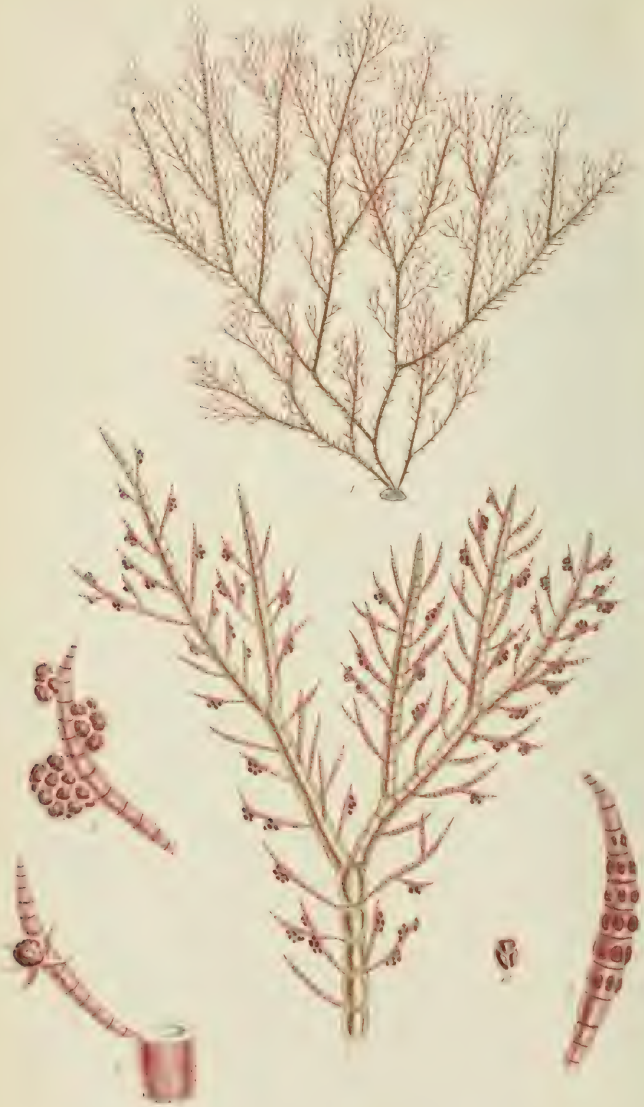

PLATE CCXV.

CERAMIUM BOTRYOCARPUM, *Griff.*

GEN. CHAR. *Frond* filiform, one-tubed, articulated; the dissepiments coated with a stratum of coloured cellules, which sometimes extend over the surface of the articulation. *Fructification* of two kinds, on distinct individuals; 1, *tetraspores* either immersed in the ramuli, or more or less external; 2, sessile, roundish *receptacles* (*favellæ*), having a pellucid limbus, containing minute, angular spores, and subtended by one or more short, involucral ramuli. CERAMIUM (*Roth.*),—from κεραμος, a *pitcher*, but the fruit is not pitcher-shaped.

CERAMIUM *botryocarpum*; filaments crooked at the base, robust, gradually attenuated upwards, irregularly dichotomous, with numerous lateral, mostly simple ramuli, the apices straight; articulations coated with coloured cellules, unarmed, the lowermost twice as long as broad, the upper shorter than their breadth; dissepiments constricted; tetraspores immersed in the articulations, whorled; favellæ globose, of small size, heaped together in irregular clusters, borne on the lateral branchlets, destitute of involucral ramuli.

CERAMIUM botryocarpum, *Griff. in Herb.—Harv. Phyc. Gen.* in list of species, vol. i. pl. xi.

HAB. On rocks and Algæ, between tide-marks. Annual. Summer. Discovered on Preston rocks, Torquay, by *Miss Amelia E. Griffiths*, (1844.) Ardrossan, *Rev. D. Landsborough.*

GEOGR. DISTR. British Islands.

DESCR. *Root* scutate, with imperfect fibres. *Stems* sharply hooked or curved at the base (not well shown in figure), thicker than hogs' bristles, gradually attenuated upwards, three to five inches long, several times branched in a more or less regular dichotomous manner, the branches erect, with sharp and narrow axillæ, the apices sometimes level-topped, sometimes of unequal length, straight, not hooked inwards. The stem and main branches are very generally clothed with short, densely and irregulary inserted, simple or rarely forked, subulate or fusiform ramuli, two or three lines in length, and tapering to both extremities, much more slender than the parts from which they spring, but otherwise of similar structure. *Articulations* coated with a stratum of minute, coloured cells, those of the lower part of the stem twice as long as broad, those of the upper about equalling their breadth; dissepiments opake, constricted. *Fructification*; 1, *tetraspores* dark purple, several in the same joint, arranged transversely, immersed, very slightly prominent. 2, *favellæ* small, round, heaped together like clusters of grapes, irregularly placed on the sides of the lateral ramuli, destitute of involucre. These are commonly produced in great profusion; but I have occasionally observed solitary favellæ, furnished with an involucre, as represented at fig. 4. *Colour*, when in perfection, a purplish red but very frequently faded into various shades of brownish and greenish yellow. *Substance* cartilaginous and firm, rather rigid, adhering, but not strongly, to paper in drying.

By comparing the figure and specific character of this plant with those of *C. rubrum* (Plate CLXXXI.), it will be seen that *C. botryocarpum* is very closely allied indeed to that species: nor should I feel disposed, acting on my own judgment, to consider it as more than a curious state, or variety, with an anomalous fruit. Mrs. Griffiths is, however, of a different opinion, and so are Professor Kützing and other botanists, to whom specimens have been submitted. To the decision of such competent observers I yield so far as to publish a figure, at the same time that I reserve my original opinion as one which I have not altogether laid aside.

C. botryocarpum is known from *C. rubrum* by its remarkable fruit, consisting of a great number of favellæ, without involucre, heaped together like bunches of grapes; in this respect it agrees with *C. Deslongchampsii*. I have, however, occasionally found solitary, involucrate favellæ, exactly similar to those of *C. rubrum*, on the same plants which produced clustered fruit on most of their branchlets. The colour is generally darker, and more purple than in *C. rubrum*, and the tips of the branchlets are straight. These are the principal characters on which it is proposed to establish the species.

C. botryocarpum was discovered by Miss Amelia E. Griffiths in 1844, in great plenty on Preston rocks, a short distance south of Torquay, and has been gathered every subsequent season in the same situations and in equal abundance. It is in perfection in June and July, and begins to decay about the middle of September.

Fig. 1. Ceramium botryocarpum;—*the natural size.* 2. Part of a branch, with fertile ramuli. 3. Ramulus with ordinary favellæ. 4. Ramulus with an involucrated favella. 5. Ramulus with tetraspores. 6. A tetraspore:—*all more or less magnified.*

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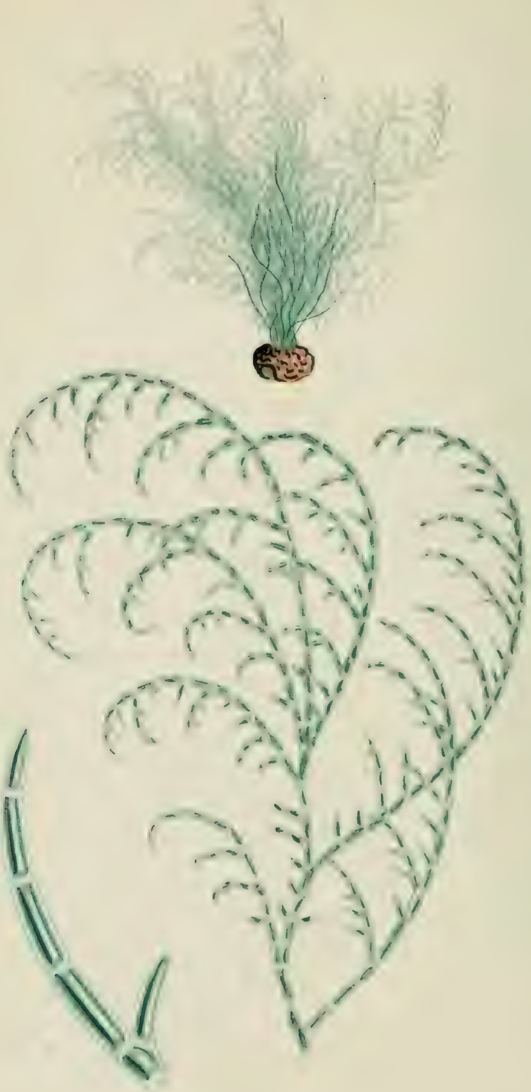
Plate [illegible]



A. H. H. del. et lith.

Reeve Benham & Reeve

PLATE CCXVI.

CLADOPHORA FALCATA, *Harv.*

GEN. CHAR. *Filaments* green, jointed, uniform, branched, *Fruit,* aggregated granules or zoospores, contained in the joints, having, at some period, a proper ciliary motion. CLADOPHORA (*Kütz.*),—from κλαδος, a *branch,* and φορεω, to *bear.*

CLADOPHORA *falcata*; densely tufted, dark-green; filaments intricate at the base, ultra-capillary, rigid, much curved, irregularly branched; branches zig-zag, repeatedly divided, the lesser divisions arched, or strongly incurved and falcate, furnished along their inner faces with short, secund, blunt ramuli; articulations three or four times longer than broad, with a dense endochrome, and pellucid dissepiments.

CLADOPHORA falcata, *Harv. in Herb.—Phy. Brit.* vol. i. p. 14.

HAB. The bottoms of clear rock-pools, near low-water mark. Annual. Summer. Rocks outside Dingle Harbour, Kerry, *W. H. H.* (1845). Jersey, *Miss White.*

GEOGR. DISTR. British Islands.

DESCR. *Filaments* densely tufted, somewhat interwoven and entangled at the base, three or four inches high, thicker than human hair, nearly of equal diameter throughout, much branched and repeatedly divided. *Branches* curved and twisted, or curled in various directions, irregularly divided; the lesser branches sometimes alternate, sometimes secund, and sometimes two or three springing from the same point, all very erect, arching or strongly hooked inwards, furnished on their concave side with numerous secund ramuli of unequal length, long and short occurring alternately, the shorter ramuli simple, formed of one or two cells; the longer bearing a second series on their faces, and hooked like the branches. The aspect of the whole tuft is peculiarly crisp and squarrose. *Articulations* tolerably uniform, three or four times as long as broad, with hyaline borders and dissepiments, and containing a dense endochrome, which partially recovers its form after having been dried. *Colour,* a rich, glossy, full green. *Substance* rigid and crisp, adhering to paper in drying.

I gathered a few specimens of the *Cladophora* here figured in the summer of 1845, in some deep rock-pools, near low-water mark, under a steep mural cliff, in a situation where the fronds were constantly in shade. More recently I have received from Miss White specimens collected at Jersey, which agree in most characters with the West of Ireland plant, but are not exactly true to the type. Beautiful, and apparently distinct, as our *C. falcata* is, I am by no means satisfied that it should be regarded as a true species. For, omitting the curled branches and the bending of the ramuli to one side, there are little or no characters to keep it separate from *C. læterirens.* I am not disposed to attach much value to the curvature of the branches, as an absolute character,—at least until the species has been longer observed; meantime, the beauty of this little plant, be it species or variety, has tempted me to bestow a figure on it.

Fig. 1. CLADOPHORA FALCATA:—*the natural size.* 2. Portion of a branch, with branchlets. 3. Articulations;—*both more or less magnified.*

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Plate CCXVII.

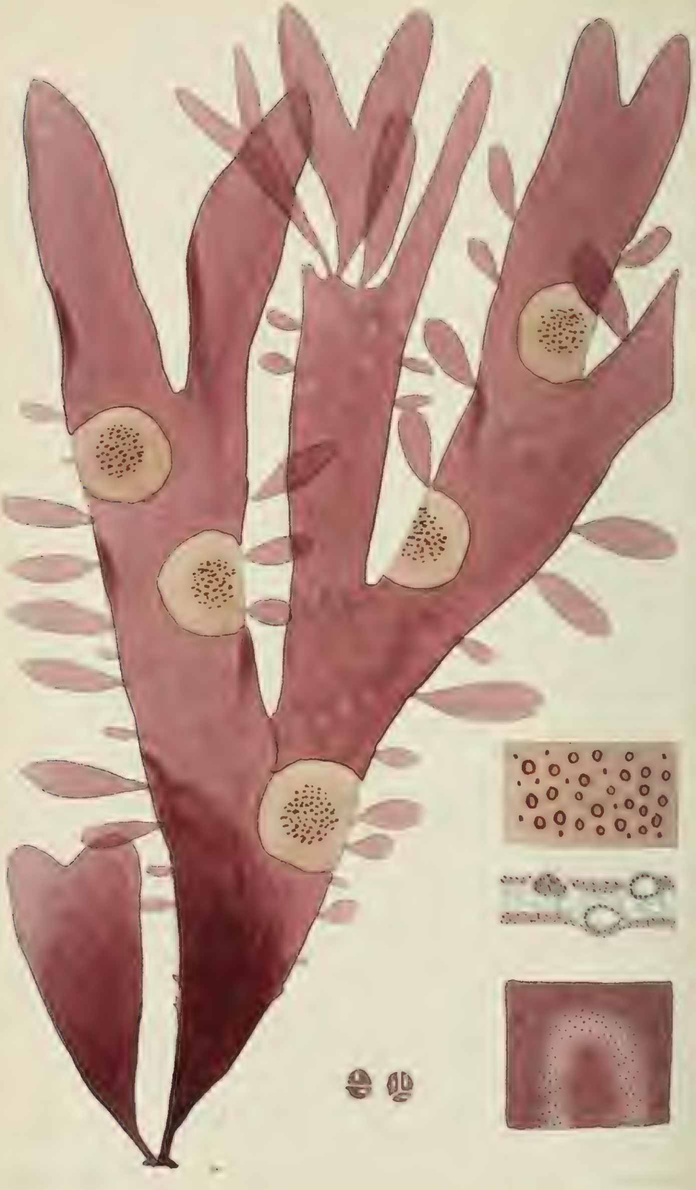

PLATE CCXVII.

RHODYMENIA? PALMATA, *Grev.*

GEN. CHAR. *Frond* flat, membranaceous, or subcoriaceous, ribless, veinless, cellular; central cells of small size; those of the surface minute. *Fructification* of two kinds, on distinct individuals; 1, convex *tubercles* (*coccidia*), having a thick, cellular pericarp, and containing a mass of minute spores, on a central placenta; 2, *tetraspores*, either zoned or tripartite, imbedded among the cells of the surface, scattered or forming cloudy patches. RHODYMENIA (*Grev.*),—from ῥοδεος, *red*, and ὑμην, a *membrane*.

RHODYMENIA *palmata*; frond coriaceous or submembranaceous, purple, broadly wedge-shaped, irregularly cleft, palmate, or dichotomous, sometimes repeatedly laciniate; the margin flat and even, sometimes winged with leaflets; granules distributed over the whole frond in cloud-like spots.

RHODYMENIA palmata, *Grev. Alg. Brit.* p. 93. *Hook. Br. Fl.* vol. ii. p. 291. *Wyatt, Alg. Danm.* no. 110. *Harv. in Mack. Fl. Hib.* part 3. p. 195. *Harv. Man.* p. 63.

SPHÆROCOCCUS palmatus, *Kütz. Phyc. Gen.* p. 409. t. 63. f. 1.

HALYMENIA palmata, *Ag. Syn.* p. 55. *Ag. Sp. Alg.* vol. i. p. 204. *Ag. Syst.* p. 242. *Spreng. Syst. Veg.* vol. iv. p. 333. *Hook. Fl. Scot.* part 2. p. 107. *Post.* and *Rupp.* p. 18.

DELESSERIA palmata, *Lamour. Ess.* p. 37.

ULVA palmata, *Dec. Fl. Fr.* vol. ii. p. 12. *With.* vol. iv. p. 123. *Lyngb. Hyd. Dan.* p. 24. *Grev. Fl. Edin.* p. 298.

FUCUS palmatus, *Linn. Sp. Pl.* p. 1630. *Huds. Fl. Ang.* p. 579. *Lightf. Fl. Scot.* p. 933. t. 27. *Good. and Woodw. Linn. Trans.* vol. iii. p. 163. *Gunn. Fl. Norv.* vol. ii. p. 69. *Turn. Syn.* p. 175. *Turn. Hist.* t. 115. *E. Bot.* t. 1306. *Hook. in Fl. Lond.* New Series, with a figure.

FUCUS ovinus, *Gunn. Fl. Norv.* vol. i. p. 96. *Mohr. Hist. Isl.* p. 245.

FUCUS caprinus, *Fl. Dan.* t. 1128. *Esper. Ic.* p. 146. t. 74.

FUCUS bullatus, *Fl. Dan.* t. 770.

FUCUS rubens, *Esper. Ic.* t. 75.

FUCUS dulcis, *Gmel. Hist.* p. 189. t. 26. *(fide Turner.)*

Var. β. *marginifera*; frond oblong, subsimple, proliferous at the margin. (*Tab. Nost. CCXVII.*)

FUCUS palmatus, *Stack. Ner. Brit.* p. 54. t. 12.

ULVA caprina, *Gunn. Fl. Norv.* vol. ii. p. 126. t. 6. f. 4.

Var. γ. *simplex*; frond undivided, wedge-shaped.

HALYMENIA palmata δ, simplex, *Ag. Syn.* p. 36.

Var. δ. *Sarniensis*; frond laciniated, the segments narrow and sublinear.

FUCUS Sarniensis, *Mert. in Roth. Cat. Bot.* vol. iii. p. 103. t. 1. *Turn. Hist. Fuc.* t. 44.

Fucus delicatulus, *Fl. Dan.* t. 1190.

Sphærococcus sarniensis, *Hook. Fl. Scot.* part 2. p. 103. *Kütz. Phyc. Gen.* p. 409.

Var. ε. *soboliferus*; frond stipitate, membranaceous, the branches very narrow below, much divided, expanding upwards into wedge-shaped, jagged and laciniate lobes.—(*Tab. Nost. CCXVIII. fig.* 2.)

Rhodymenia sobolifera, *Grev. Alg. Brit.* p. 95. *Hook. Br. Fl.* vol. ii. p. 292. *Harv. in Mack. Fl. Hib.* part 3. p. 195. *Harv. Man.* p. 63.

Sphærococcus soboliferus, *Kütz. Phyc. Gen.* p. 409.

Halymenia sobolifera, *Ag. Syn.* p. 36. *Ag. Sp. Alg.* vol. i. p. 218. *Ag. Syst.* p. 246. *Hook. Fl. Scot.* part 2. p. 107.

Ulva sobolifera, *Lyngb. Hyd. Dan.* p. 27.

Fucus soboliferus, *Fl. Dan.* p. 1065. *Turn. Hist.* t. 45. *Wahl. Fl. Lapp.* p. 947. *E. Bot.* t. 2133.

Hab. On rocks within tide marks; and on the stems of *Fuci, Laminariæ*, &c. Annual or biennial. Winter and spring. Common on all the British shores. β. and γ. on the stems of *Laminariæ*. ε. on *Fucus serratus*.

Geogr. Dist. Shores of Northern and Arctic Europe. Iceland. Greenland. Eastern shores of North America. Unalaschka. Kurile Islands. Kamskatka. Falkland Islands. Tasmania.

Descr. *Root*, a small disc. *Fronds* solitary or tufted, rising from a more or less evident subcylindrical stipe, from a line to half an inch long, or more, which soon flattens into the wedge-shaped base of the lamina; *lamina* broadly wedge-shaped or fan-shaped, somewhat fastigiate, more or less deeply cloven into numerous segments, which are often again and again divided in a palmate or subdichotomous manner. So variable is the degree of division in different specimens that it is impossible to write a general character which shall embrace all the forms. In some, the frond is quite simple, broadly oval or wedge-form; in others it is cleft into four or five principal segments, the margin emitting leaf-like lobes:—these varieties are usually of large size, 12–18 inches long, of a coriaceous substance and dark colour. Other states (vars. δ. and ε.) are thinner in substance, and excessively divided, the lower segments filiform, the upper split into innumerable narrow ribbons, often not half a line in breadth; these sometimes expand again into wedge-shaped lobes, laciniated at the extremity; and sometimes the whole frond is excessively branched, and none of its divisions more than half a line in breadth; the narrow and laciniate varieties are seldom more than five or six inches in length. *Fructification*; *tetraspores*, half immersed in the frond, forming large cloudy patches dispersed over the whole frond. Besides these, an imperfect *tubercular* fructification (?) is sometimes found, forming circular spots surrounded by a discolouration. Within the circle are congregated innumerable minute, dark-coloured pustules, immersed in the frond, slightly prominent and either empty, or containing a mass of granular endochrome. *Substance* in the larger varieties leathery, in the smaller membranaceous; the latter adhering closely to paper. *Colour*, a purplish or brownish red; sometimes pinky.

Fig. 1. Rhodymenia palmata, var. β.:—*of the natural size*. 2. Portion of the surface with tubercles (?). 3. Section of the frond and *tubercles* (?). 4. Portion of the surface, with part of a *Sorus*. 5. Tetraspores:—*all more or less magnified.*

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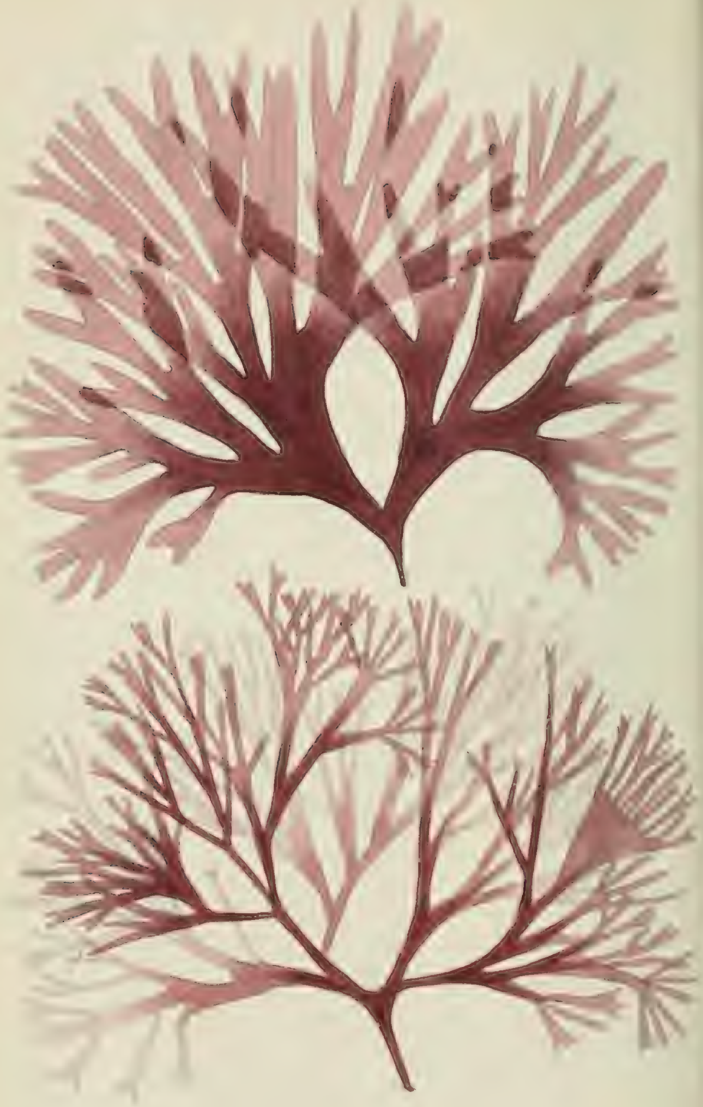

Plate CCXVIII.

RHODYMENIA PALMATA; *vars. a and ε.*

(*For description, see last folio.*)

This and the preceding plate represent three forms of *Rhodymenia palmata*, the well known *Dulse* of the Scotch, and *Dillisk* of the Irish;—and had I figured all the characteristic specimens which my Herbarium supplies, I might easily have extended the illustrations to a dozen plates. To connect Fig. 1. of Pl. CCXVII, with Fig. 3. of Pl. CCXVIII, by a full suite of specimens would require many figures. At first sight it will scarcely be supposed that they can belong to the same plant, and yet these figures by no means exhibit the extreme of variation, for there are varieties more simple than the one and more finely divided than the other. There is one state (var γ.) in which the frond is absolutely a simple elliptical leaf, without any division, or with a faint tendency to lobation at their apex. And there is another (var ϵ.) which is occasionally cut into multitudes of many-cleft ribbon-like segments, in no place more than half a line in width. And yet these two forms can be clearly brought together by specimens of intermediate character.

When such varieties are seen in a dried state in the herbarium, they appear so different that one may anticipate much difficulty in tracing the limits of the species. And it might indeed be difficult to do so with the assistance merely of dried specimens and of the descriptions of authors. But on the shore the collector experiences no such difficulty. If he has once seen and *tasted* a piece of Dulse, the characters, irrespective of form, are too well marked to allow of his puzzling himself with mere variations in outline. And what is very remarkable, the broad and slightly divided varieties may often be found growing side by side with the finely cut narrow ones. I have frequently noticed that where the Dulse grows on rock, it is broad and slightly divided; but when it grows on *Fucus serratus*, on the same rock, it is cut into the form called *sobolifera*. This would seem to prove that habitat had some effect, or, in other words, that the root of this seaweed was something more than a mere holdfast. Yet epiphytic (or parasitic) attachment has not always the same effect on this plant; for the simplest form of this species is undoubtedly found on the stems of *Laminaria digitata*, and authors give the same stems as a habitat for the finely cut variety, *sobolifera.* My own experience would confine this variety to the stems of *Fucus serratus* and *vesiculosus.*

The extensive list of synonyms given in the description shows a large number of book species formed out of the varieties of this plant. Most of these are admitted by modern authors to be, what I have considered them, merely forms of *R. palmata.* But my var ε. has hitherto, in British works, maintained its place under the name *R. sobolifera.* I can only say that I can in no respect distinguish specimens which I have received from Orkney, the original British habitat of *R. sobolifera*, from others collected on the Irish coast which I have clearly traced, through connecting forms, into the common *palmata.* I am therefore at a loss to know on what character to uphold *sobolifera.* Colour and substance are here too variable to allow of their being taken into account; some of the most pinky and delicately membranous specimens which I possess, have the outline of the true *palmata*, not of *sobolifera.*

In Ireland and Scotland this plant is much used by the poor, as a relish with their food. It is commonly dried, in its unwashed state, and eaten raw, the flavour being brought out by long chewing. On many parts of the west coast of Ireland, it forms the only addition to potatoes, in the meals of the poorest class. The variety which grows on mussel shells between tide marks is preferred, being less tough than other forms, and the minute mussel shells and other small shell-fish which adhere to its folds are nowise unpleasing to the consumers of this simple luxury, who rather seem to enjoy the additional *gout* imparted by the cranched mussels. In the Mediterranean this plant is used in a cooked form, entering into ragouts and made dishes; and it forms a chief ingredient in one of the soups recommended, under the name of "St. Patrick's Soup," by M. Soyer to the starving Irish peasantry.

Fig. 1. RHODYMENIA PALMATA, var *a*. 2. The same, var. ε:—*both the natural size.*

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Plate CCXX.

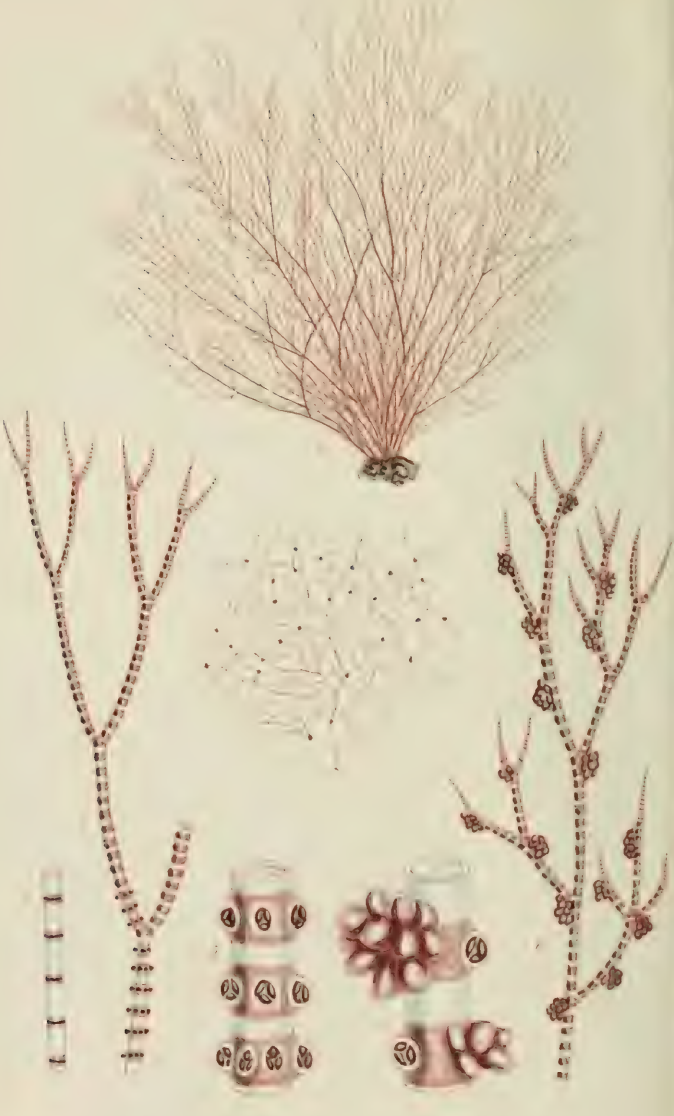

PLATE CCXIX.

CERAMIUM DESLONGCHAMPII, *Chauv.*

GEN. CHAR. *Frond* filiform, one-tubed, articulated; the dissepiments coated with a stratum of coloured cellules, which sometimes extend over the surface of the articulation. *Fructification* of two kinds, on distinct individuals; 1, *tetraspores,* either immersed in the ramuli, or more or less external; 2, sessile, roundish *receptacles* (*favellæ*), having a pellucid limbus, containing minute, angular spores, and subtended by one or more short, involucral ramuli. CERAMIUM (*Roth.*), —from κεραμος, a *pitcher,* but the fruit is not pitcher-shaped.

CERAMIUM *Deslongchampii*; filaments subsetaceous, attenuated upwards, rigid, irregularly dichotomous, with or without lateral ramuli; the apices straight, spreading; articulations colourless, those of the main stems about thrice as long as broad, of the branches and ramuli much shorter; dissepiments opake, scarcely swollen; tetraspores whorled round the joints, prominent; favellæ (?) heaped together, bursting irregularly from the sides of the branches, destitute of involucral ramuli.

CERAMIUM Deslongchampii, *Chauvin, Alg. Norm.* *J. Ag. Advers.* p. 26. *Wyatt, Alg. Danm.* no. 218. *Hook. et Harv. in Lond. Journ.* vol. vi. p. 410.

CERAMIUM Agardhianum, *Griff. in Harv. Man.* p. 99.

GONGROCERAS Deslongchampii, *Kütz. in Linn.* 15. p. 735. *Phyc. Gen.* p. 379. t. 46. f. 1.

HAB. On rocks and stones between tide-marks, and on the smaller Algæ. Annual. Spring and summer. Generally distributed round the British coasts. Torquay, *Mrs. Griffiths.* Swansea, *Mr. Ralfs.* Mine Head, Somerset, *Miss Gifford.* Ardrossan, *Rev. D. Landsborough.* Frith of Forth, *Dr. Greville.* Belfast Bay, *Mr. Templeton.* Dublin Bay, *Miss Ball.* Very abundant at Balbriggan, &c., *W.H.H.*

GEOGR. DISTR. Coast of France. Heligoland, *Binder*! Tasmania, *Gunn.*

DESCR. *Root* discoid, occasionally giving off short fibres. *Fronds* densely tufted, from two to four or five inches long, rather thicker than human hair, rigid and with a rough feel, slightly attenuated upwards, branched in a more or less regularly dichotomous order, the angles not very patent. *Branches* much divided, either naked throughout, or giving off, in greater or less abundance, short, simple, or forked, lateral ramuli. These ramuli are distributed in a very irregular manner; sometimes alternate, more frequently secund, and often very densely crowded, especially in the upper portion of the frond, which then becomes very bushy. Sometimes, as represented in fig. 2, the frond is very much distorted; the branches spreading at right angles, and the ramuli variously curved and twisted. *Apices* of the branches straight and spreading, subulate. *Articulations* pellucid, those of the lower part of the stem about thrice as long as broad, of the branches about equalling their breadth, and of the ramuli gradually shorter; *dissepiments* dark-coloured, cylindrical, or slightly swollen. *Tetraspores* several in each joint, whorled, large, and very prominent. *Favellæ* (?) imperfectly organized, very irregular in form, issuing in dense clusters from the sides of the branches, heaped together, destitute of involucre, containing a fine dark-coloured powder, but no regularly formed *spores*. These favellæ (?) are produced by the same individuals that contain tetraspores. *Substance* rigid, not closely adhering to paper, unless after long steeping in fresh water. *Colour*, a dark brownish purple or blackish red.

A more slender plant than *C. diaphanum*, of a darker colour, and with shorter joints, and further distinguished from that species by the straight tips of the branches, more prominent tetraspores, and above all, by the clustered *favellæ*, bursting in irregular masses from various parts of the stem and branches. I confess that I cannot regard these clusters as a normal fructification, nor am I confident that they are even imperfectly formed favellæ, but rather consider them as erumpent masses of cells, of an anomalous character. From true favellæ they differ in being destitute of involucral ramuli, and also in their structure, the contents being a fine powder compacted together, without trace of *spores*, such as are usually found in these organs.

A distorted variety (fig. 2) frequently occurs among normal specimens, and this is very generally furnished with the anomalous fruit. Some specimens are excessively squarrose, with the stem and branches regularly bent at short distances, and every ramulus divaricating.

Our figure has been printed in too red an ink.

Fig. 1. Tuft of CERAMIUM DESLONGCHAMPII. 2. A distorted frond:—*both of the natural size.* 3. Portion of the main stem. 4. Apex of a branch, with imbedded tetraspores. 5. Fertile joints from the same, with tetraspores *in situ.* 6. Apex of a branch, with erumpent *favellæ* (?). 7. Joints from the same, with *favellæ* (?) and *tetraspores*:—*all more or less magnified.*

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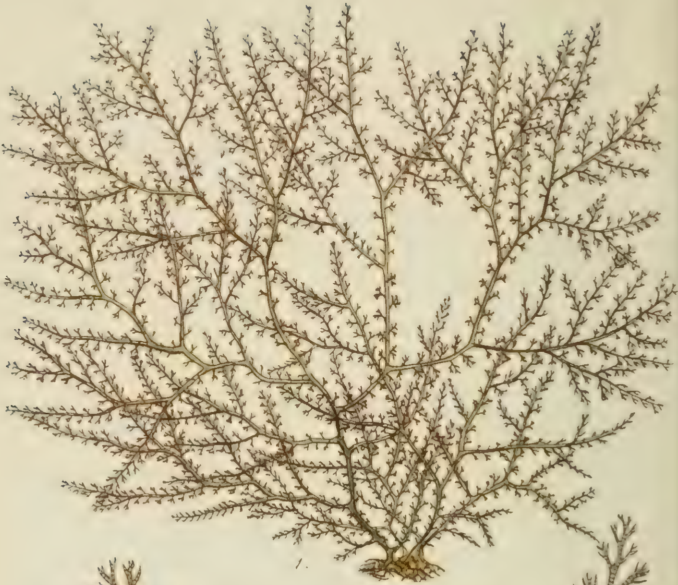
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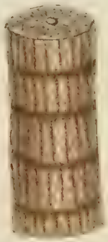
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PLATE CCXX.

RYTIPHLÆA FRUTICULOSA, *Harv.*

GEN. CHAR. *Frond* filiform or compressed, pinnate, transversely striate, reticulated; the axis articulated, composed of a circle of large, tubular, elongated cells (*siphons*), surrounding a central cell; the periphery of several rows of minute, irregular, coloured cellules. *Fructification* of two kinds, on distinct individuals; 1, ovate *capsules* (*ceramidia*), containing a tuft of pear-shaped spores; 2, *tetraspores*, contained in minute lanceolate *receptacles* (*stichidia*), in a double row. RYTIPHLÆA (*Ag.*),—from ρυτις, a *wrinkle*, and φλοιος, the *bark*; because the surface is transversely wrinkled or striate.

RYTIPHLÆA *fruticulosa;* stems diffuse, branched from the base; branches divaricating pinnato-dichotomous, set in the lower part with short, horizontal, multifid ramuli; in the upper more or less pinnated with larger, similarly divided branchlets; axils rounded; ceramidia ovate, sessile, densely set; tetraspores in distorted ramuli.

POLYSIPHONIA fruticulosa, *Spreng. Syst. Veg.* vol. iv. p. 350. *Duby, Bot. Gall.* p. 966. *Harv. in Mack. Fl. Hib.* part 3. p. 205. *Harv. in Hook. Br. Fl.* vol. ii. p. 327 (*in part*). *Harv. Man.* p. 86. *Wyatt, Alg. Danm.* no. 132. *Mont. Crypt. Alg.* n. 19. *Fl. Alg.* p. 81. *Mont. Crypt. Canar.* p. 170. *Endl. 3rd Suppl.* p. 46.

POLYSIPHONIA Wulfeni, *Ag. Alg. Medit.* p. 144. *Kütz. Phyc. Gen.* p. 431.

HUTCHINSIA fruticulosa, *Ag. Syst.* p. 27.

HUTCHINSIA Wulfeni, *Ag. Sp. Alg.* vol. ii. p. 95.

GRAMMITA Wulfeni, *Bonn. Hyd.* p. 27.

CERAMIUM Wulfeni, *Roth, Cat. Bot.* vol. iii. p. 140.

FUCUS fruticulosus, *Wulf. in Jacq. Col.* p. 159. t. 16. *Crypt. Ag.* p. 56. *Esper, Ic. Fuc.* p. 165. t. 87. *Clem. Ess.* p. 319. *E. Bot.* t. 1686. *Turn. Syn. Fuc.* vol. ii. p. 394. *Turn. Hist.* t. 227.

HAB. In pools left by the tide, growing on the rocky bottom, or on Corallines and other small Algæ. Perennial. Summer. Common on the western and southern shores of the British Islands.

GEOGR. DISTR. Atlantic and Mediterranean shores of Europe. Northern coasts of Africa. Canary Islands.

DESCR. *Root* a mass of creeping, entangled fibres. *Fronds* forming large, globose tufts, often six inches in diameter, composed of a great number of separate stems intertwined together. *Stems* 4–6 inches long, twice as thick as hog's bristle, gradually attenuated upwards, branched from the base and bushy. Main *branches* somewhat dichotomous, spreading at wide angles; the upper and small divisions repeatedly pinnate, or irregularly branched. The lower branches are furnished with alternate, multifid ramuli, a line or two in length and very patent; the upper more regularly pinnate with longer branchlets, which are set with simple or multifid subulate ramuli. Every part of the frond is marked by dark-coloured transverse striæ, set at short distances asunder (revealing the joints of the internal axis), and the whole surface is reticulated with anastomosing cells. *Fructification*: 1, *Ceramidia*, densely crowded on the ramuli, ovate, sessile; rarely produced: 2, tetraspores imbedded in the multifid, lateral ramuli. *Substance* cartilaginous and firm, the tips of the branches standing out, and each retaining a drop of water when the specimen is lifted into air. *Colour* a dark purple, changing into olive green, and finally to amber-yellow under the influence of sunlight.

I have always thought that in whatever genus we put *Rytiphlæa complanata* of Agardh, in the same we must place not only the *Polysiphonia thuyoides* of British authors, but *P. fruticulosa* also. The internal structure of these plants is identical. They all possess a central jointed axis composed of many tubes, like the frond of *Polysiphonia*, coated on the outside by a broad band of small irregular cells. The surface appears reticulated under the microscope, and marked at short intervals by dark-coloured transverse lines. These characters belong to the frond of *Rytiphlæa*, in which genus Agardh places the first of the three plants in question; while both the latter have hitherto been referred to *Polysiphonia*. As I have already (Pl. CLXX.) adopted Agardh's name for the former, I am now constrained to alter the position of the two latter, and transfer them from *Polysiphonia* to *Rytiphlæa*. These three plants have not only a similar structure, but have so much the same natural habit, that specimens may be found which bring them *inconveniently* near each other. Some specimens of *R. fruticulosa* are very close to some of *R. thuyoides*, and the latter, in like manner, closely approaches narrow states of *R. complanata*. So nearly do they approach, that at one time I regarded them all as merely sportive forms of one species, but this was before I had much opportunity of studying them in a living state. When growing, each possesses characters sufficiently obvious. It is only in a few cases of imperfect or badly dried specimens that the student will find it difficult to decide to which species the specimen should be referred.

The ceramidia of this species are not often found, but when they occur they are generally formed in profusion, almost every twig bearing one or two. They are always borne on less luxuriant specimens than those which yield tetraspores.

Fig. 1. RYTIPHLÆA FRUTICULOSA:—*of the natural size*. 2. Small branch with ceramidia. 3. A ceramidium *in situ*. 4. Small branch from another plant. 5. Ramulus with imbedded *tetraspores*. 6. Tetraspore. 7. Portion of the stem. Section of the same:—*all more or less magnified*.

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Plate CCXXI.

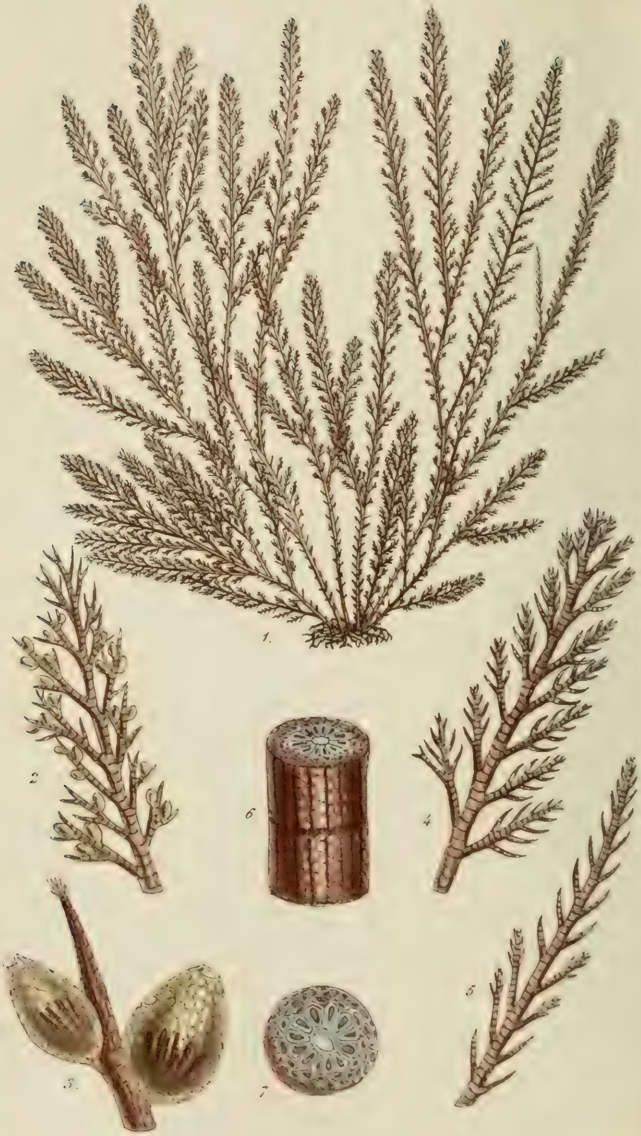

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PLATE CCXXI.

RYTIPHLÆA THUYOIDES, *Harv.*

GEN. CHAR. *Frond* filiform or compressed, pinnate, transversely striate, reticulated; the axis articulated, composed of a circle of large, tubular, elongated cells (*siphons*), surrounding a central cell; the periphery of several rows of minute, irregular, coloured cellules. *Fructification* of two kinds, on distinct individuals; 1, ovate *capsules* (*ceramidia*), containing a tuft of pear-shaped spores; 2, *tetraspores*, contained in minute, lanceolate *receptacles* (*stichidia*) in a double row. RYTIPHLÆA (*Ag.*),—from ρυτις, a *wrinkle*, and φλοιος, the *bark*, because the surface is transversely wrinkled or striate.

RYTIPHLÆA *thuyoides*; stems erect, rising from creeping fibres, terete; below simple and set with short, spine-like ramuli; above much branched; branches alternate, very erect, bi-pinnate; pinnæ multifid or pinnulate; axils rounded; ceramidia ovate, sessile, densely set.

POLYSIPHONIA thuyoides, *Harv. in Mack. Fl. Hib.* part 3. p. 205. *Wyatt, Alg. Danm.* no. 305. *Harv. Man.* p. 86. *E. Bot. Suppl.* t. 2882.

GRAMMITA rigidula, *Bonnem.*

HAB. In pools left by the tide, growing either on the rocky bottom or on Corallines and other small Algæ. Perennial. Summer. Abundant on the west coast of Ireland. Portrush, *Mr. Moore.* Howth and Balbriggan, *Miss Gower.* Ayrshire coast, *Mr. Thompson and Rev. D. Landsborough.* South coast of England, Devonshire, *Mrs. Griffiths.* Mountsbay and Ilfracombe, *Mr. Ralfs.* Jersey, *Miss White.*

GEOGR. DISTR. Atlantic shores of Europe.

DESCR. *Root*, a widely spreading mass of creeping fibres. *Fronds* from three to six inches high, twice as thick as hog's bristle, forming wide, but not very crowded tufts. *Stems* very variable in division: in some specimens nearly simple, with three or four long, rod-like branches, set with very short pinnulate ramuli; in others naked at the base, but closely and regularly pinnated or bipinnated from the middle upwards, the pinnæ long and virgate, closely pinnulate. Other specimens are excessively bushy, the branches springing from the upper part of the stem in a very irregular manner. In all varieties the branches are remarkably erect, and generally straight, and more or less regularly pinnate or bipinnate. *Ramuli* below simple and subulate, above pinnulate and forked, one or two lines long. The whole frond is marked with transverse striæ at distances about equal to the diameter, and the surface is reticulated with anastomosing cells. *Fructification*; *ceramidia* oblong-ovate, densely crowded on the ramuli, sessile, containing a tuft of pear-shaped spores. *Tetraspores* in distorted ramuli. *Substance* somewhat rigid, between cartilaginous and membranaceous. *Colour*, a fine dark brownish purple, becoming more or less tinted with olive when exposed to sunlight.

From *Rytiphlæa complanata* this species may always be known by its darker colour, cylindrical stems, and generally by a narrower frond. In ramification and general habit there is much similarity. The two may sometimes be found growing in close proximity, and even mixed together, but I have generally observed that *R. thuyoides*, which is the stiffest in substance, usually grows in the shallow parts of the tide-pool, sometimes standing out of the water; while *R. complanata* never dries during the recess of the tide. On the west coast of Ireland this is a very abundant plant, growing on most rocky shores. It forms dense tufts of large size, but is often much stunted, and is only to be found well grown in the deeper pools near low-water mark.

From *R. fruticulosa* the erect habit and more regularly pinnate ramification distinguish it. In some specimens these characters are less strikingly manifest than in others, but it rarely happens that the branching is so patent or irregular as to cause the specimens to be mistaken for one of the former species.

Small specimens of *Polysiphonia nigrescens* much resemble the present species in habit, but are at once known under the microscope, by the very different structure of the frond.

Fig. 1. RYTIPHLÆA THUYOIDES:—*of the natural size.* 2. Branch with *Ceramidia.* 3. *Ceramidia.* 4, 5. Branchlets from different specimens. 6. Portion of the stem. 7. Transverse section of the same:—*all more or less magnified.*

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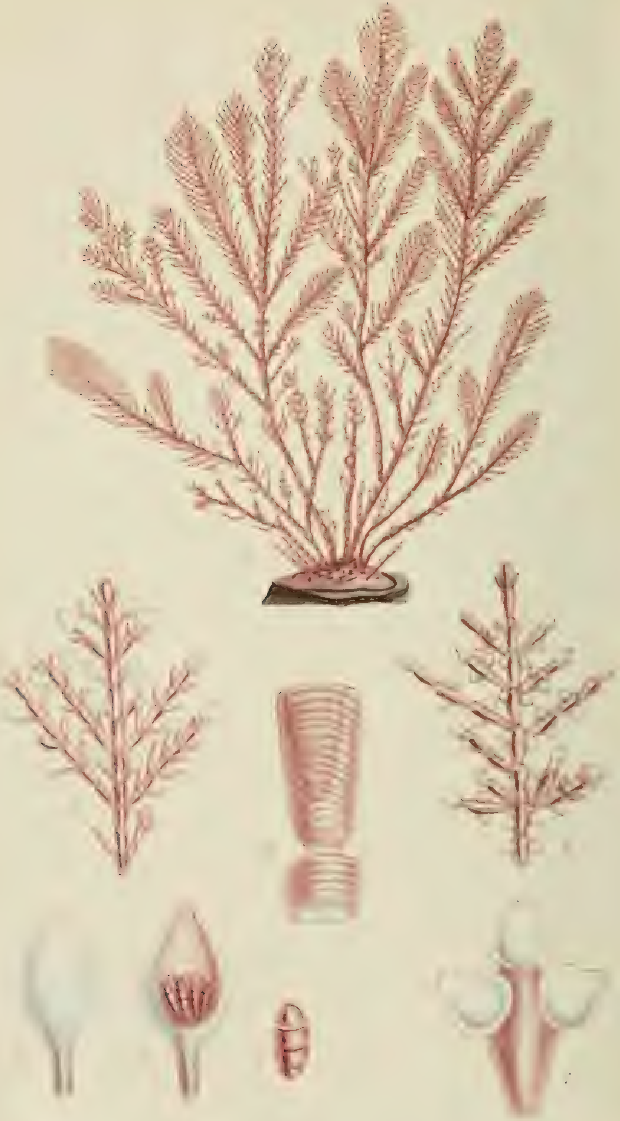

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PLATE CCXXII.

CORALLINA OFFICINALIS, *Linn.*

GEN. CHAR. *Frond* filiform, articulated, branched (mostly pinnate), coated with a calcareous deposit. *Fructification;* turbinate or obovate, mostly terminal *ceramidia,* pierced at the apex by a minute pore, and containing a tuft of erect, pyriform, or club-shaped, transversely parted tetraspores. CORALLINA (*Linn.*), — from *Coralium, coral,* which these plants resemble in being of a stony nature.

CORALLINA *officinalis*; decompound-pinnate; lower articulations cylindrical, twice as long as broad; upper slightly obconical, round-edged, their upper angles blunt; ultimate ramuli cylindrical, obtuse.

CORALLINA officinalis, *Syst. Ed.* x. p. 805. *Pal. Elench.* p. 422. *Ellis in Phil. Trans.* vol. 57. p. 419. t. 17. f. 12, 13. *Linn. Corresp.* vol. i. p. 201. *Soland. Zoop.* p. 118. t. 23. f. 14, 15. *Esper. Corall.* t. 3. *Berk. Syn.* vol. i. p. 211. *Jameson in Wern. Mem.* vol. i. p. 563. *Turt. Gmel.* vol. iv. p. 671. *Turt. Br. Faun.* p. 211. *Stem. Elem.* vol. ii. p. 439. *Cuv. Reg. An.* vol. iii. p. 305. *Lamour. Cor. Flex.* p. 283. *Lamour. Corall.* p. 127. *Lamk. An. S. vert.* vol. ii. p. 328. 2nd edit. vol. ii. p. 513. *Flem. Brit. An.* p. 514. *Gray, Brit. Pl.* vol. i. p. 339. *Blainv. Actinol.* p. 547. t. 96. f. 3, 3 *a.* *Johnst. Br. Sponges and Lith.* p. 216. *Decaisne, Ess.* p. 107. *Kütz. Phyc. Gen.* p. 388. t. 79. f. 1. *Endl. 3rd Suppl.* p. 48. *Mont. Fl. Alger.* p. 128.

CORALLINA anglica, *Ger. Herb.* 1572. *Merrett, Pin.* 30. *Raii, Hist.* vol. i. p. 65. *Syn.* 33. no. 1.

HAB. On rocks between tide-marks, extending throughout the whole of the litoral zone, generally growing in rock-pools. Perennial. Winter and spring. Abundant on all the rocky shores of the British Islands.

GEOGR. DISTR. Throughout the northern Atlantic Ocean and in the Mediterranean Sea. (Extra-European habitats require investigation.)

DESCR. *Root,* a widely spreading, calcareous crust. *Fronds* from one to six inches high, twice as thick as hog's bristle, congregated in dense tufts, or spreading in continuous patches over a wide surface of rock, varying much in ramification and general aspect, according to the depth at which vegetation takes place. Well-grown specimens are 4–6 inches high, more or less regularly pinnate, or bi-tripinnate; the pinnæ sometimes rising, in opposite pairs, from every joint; in others several joints intervene between each pair of pinnæ, or one pinna is wholly suppressed. Various irregularities in branching take place from suppression, and some specimens are thus reduced to long naked, alternate or spuriously dichotomous branches; while others are regularly feathered throughout. *Ramuli* slender, cylindrical, obtuse, composed of joints three or four times as long as broad. *Articulations* in the lower part of the stem cylindrical, about twice as long as broad, or somewhat shorter: those of the upper branches more or less pear-shaped or obconical, gradually swelling from the base upwards, slightly compressed, but rounded at the edges, and having the upper angles very obtuse, and not prominent. When the calcareous matter is removed by acid, the surface appears transversely striate. *Conceptacles* of two kinds: 1, ovate *ceramidia*, pierced with a minute pore, and containing a tuft of transversely parted oblong, tetraspores; these terminate the branches and ramuli, and are of a pearly white colour. 2, slightly urceolate or mamillæform ceramidia of smaller size, springing irregularly from various parts of the articulations, and sometimes so densely crowded as to cover the whole articulation. These probably also contain tetraspores, but those which I examined were empty. The structure is similar to that of *C. squamata*. *Colour*, when growing in deep water or in shade, a dull, and rather dark purple; under sunlight passing through various shades of dull red and yellow to a milk white, which is the common colour of specimens cast on the beach.

* * *

This species is abundant on the shores of all countries within the temperate zone of the northern Atlantic, and perhaps it would not be too much to include distant regions of the Southern Ocean and the Pacific, among its habitats. Authors, however, have given distinct names to specimens coming from the south; and too much uncertainty prevails among the exotic species of the genus *Corallina* to allow of our attempting, in the present place, a reconciliation of synonymes. Even on our own shores this plant puts on so many sportive appearances, that it would be easy to form from its varieties numerous species, as distinct as some that have been founded on single fragments coming from abroad. *Colour* has been assumed as a character in describing these plants. Nevertheless it is notorious that the colours of all Corallines are remarkably fugacious, and that all quickly bleach, under the influence of the weather, to a milky whiteness. The *form* of the joints, almost the only tangible character, is subject to very wild variations, so that it is almost impossible, without a very full suite of specimens, to fix the limits of any of these plants. Our figure represents what may be regarded as the normal form of *C. officinalis*, but this is very unlike the stunted variety which occurs near high-water mark. In the latter, the joints are sometimes palmate, and much spread out; and altogether the plant looks so unlike its normal state that it may well be taken, as it has been, for something different.

According to Dr. Johnson, several of the *Melobesiæ* are to be regarded as merely imperfectly developed states of this Coralline.

Fig. 1. CORALLINA OFFICINALIS:—*of the natural size.* 2. Branch with *normal* ceramidia. 3. A Ceramidium. 4. The same, cut vertically. 5. A tetraspore from the same. 6. Branch with *abnormal* ceramidia. 7. Joint from the same, with three ceramidia. 8. Portion of the frond, after maceration in acids:—*all more or less magnified.*

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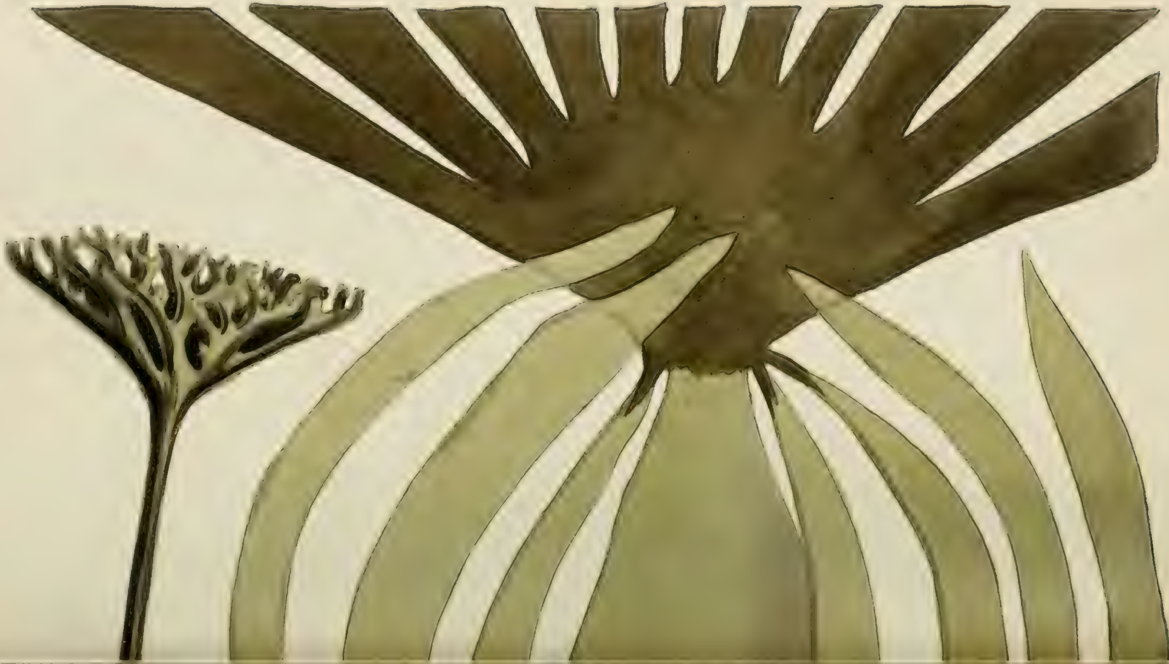

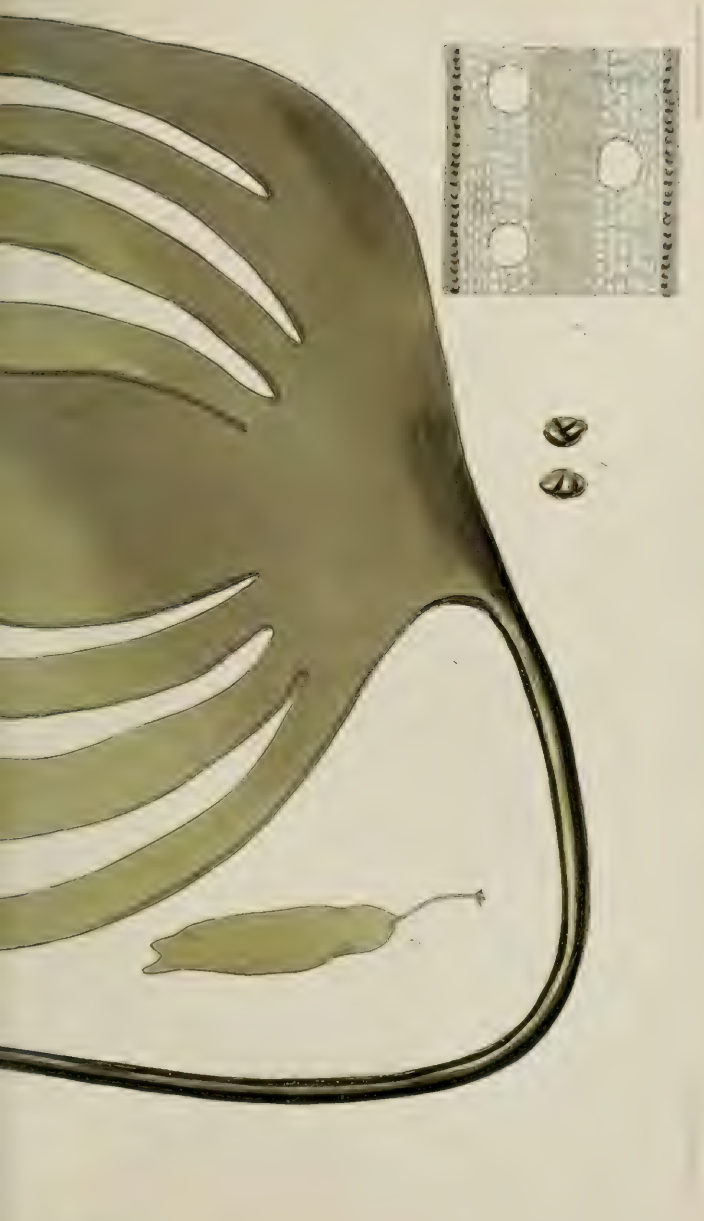

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PLATE CCXXIII.

LAMINARIA DIGITATA, *Lamour.*

GEN. CHAR. *Frond* stipitate, coriaceous or membranaceous, flat, undivided or irregularly cleft, ribless. *Fructification*; cloudy spots of spores, imbedded in the thickened surface of some part of the frond. LAMINARIA (*Lamour.*),—from *lamina*, a thin plate, in allusion to the flat frond.

LAMINARIA *digitata*; stem long, woody, cylindrical, gradually tapering and somewhat compressed upwards, expanding into a leathery, roundish-oblong frond, deeply cleft into many linear segments.

LAMINARIA digitata, *Lamour. Ess.* p. 22. *Lyngb. Hyd. Dan.* p. 20. *Ag. Sp. Alg.* vol. i. p. 112. *Ag. Syst.* p. 270. *Grev. Alg. Brit.* p. 27. *Hook. Br. Fl.* vol. ii. p. 271. *Harv. in Mack. Fl. Hib.* part 3. p. 171. *Harv. Man.* p. 23. *Wyatt, Alg. Danm.* No. 156. *Endl. 3rd. Suppl.* p. 27. *Post. and Rupr.* t. 12. *J. Ag. Sp. Alg.* vol. i. p. 134.

LAMINARIA stenoloba, *De Lap. Terr. Neuv.* p. 55.

HAFGYGIA digitata, *Kütz. Phyc. Gen.* p. 346. t. 30. *and* 31.

FUCUS digitatus, *Linn. Mant.* p. 134. *Fl. Dan.* t. 392. *Stack, Ner. Brit.* p. 5. t. 3. *Esper, p.* 99. t. 48, 49. *Huds. Fl. Angl.* p. 579. *Lightf. Fl. Scot.* p. 935. *With.* 4. p. 98. *Linn. Trans.* 3. p. 152. *Turn. Syn.* p. 207. *Turn. Hist.* t. 162. *E. Bot.* t. 2274.

FUCUS hyperboreus, *Gunn. Fl. Norv.* 1. p. 34. t. 3.

HAB. On rocks in the sea, beyond the reach of the tide, extending to the depth of about fifteen fathoms. Perennial. Winter. Abundant on the shores of the British Islands.

GEOGR. DISTR. The Icy sea, and Northern Atlantic, from Norway to Spain, and from Greenland to the shores of Massachussetts (*at least*). Kamtschatka.

DESCR. *Root*, a conical mass composed of numerous, stout, branching fibres, each of whose branches ends in a flattened disc which takes a strong hold of the rocky bottom. *Stem* from two to six feet long, cylindrical, solid, in large specimens upwards of an inch in diameter near the base, gradually tapering upwards and becoming compressed towards the summit, where it passes into the base of the frond. *Frond* from one to five feet long, and from one to three feet in breadth, deeply cleft from the apex nearly to the base into an uncertain number of linear, strap-shaped, acute or obtuse segments. *Fructification* dark coloured, cloud-like patches, seen on old fronds, consisting of a stratum of innumerable, minute, angular, dark-coloured spores, concealed beneath the surface cells. *Substance* in the stem woody, but flexible, hard and horny when dry; in the frond, leathery. *Structure* cellular; the cells of the central portion of stem and frond very minute; those of the periphery larger; in the frond quadrate, with spherical air-cells at intervals. *Colour*, a fine clear olive, becoming darker in age.

A well known plant, the common *Sea-girdles* or *Tangle*, which grows to a large size on all rocky coasts. Our figure may appear a caricature to persons acquainted only with the plant in the state in which it is usually cast ashore, but I have purposely selected a specimen to illustrate its very curious mode of growth. The root and stem are perennial, but the many-cleft leaf is renewed every season and the old one cast off. Our specimen represents the nearly perfectly formed leaf of the present season and the base of the leaf of last year adhering to the tips of its segments. The mode of growth is as follows: As soon as the existing frond has served its purpose and begins to grow brown, an expansion commences between its base and the apex of the stem. This expansion continues to increase in length and breadth till it has attained a considerable size. We have then a large ovate lobe at the apex of the stem, separated by a deep constriction from the old frond. As yet this lobe is quite entire; but after a while longitudinal splits, commencing near its margin, and continuing towards its centre begin to appear. These widen and lengthen by degrees, and at last the outer ones reach the decaying base of the old frond; a rupture ensues, and the tip of the new segment is free. This process is continued, until, when many segments have thus been formed, the connection between the old leaf and the now nearly perfect new one is so much weakened, that the former adheres by a very small surface, and is soon cast off altogether. Our figure is taken from a specimen in which this is about to take place.

This mode of growth appears common to all the Laminariæ, in many of which Mrs. Griffiths has been the first to observe it; and I take this opportunity of expressing my warmest thanks to that lady for a magnificent suite of the present species, exhibiting the growing frond in all stages of its developement.

Fig. 1. Plant of LAMINARIA DIGITATA, (small), just before casting the frond of the previous season. 2. Young seedling plant:—*both of the natural size.* 3. Section of the frond, with spores and air cells in *situ*. 4. Spores:—*both magnified.*

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Plate CCXVII.

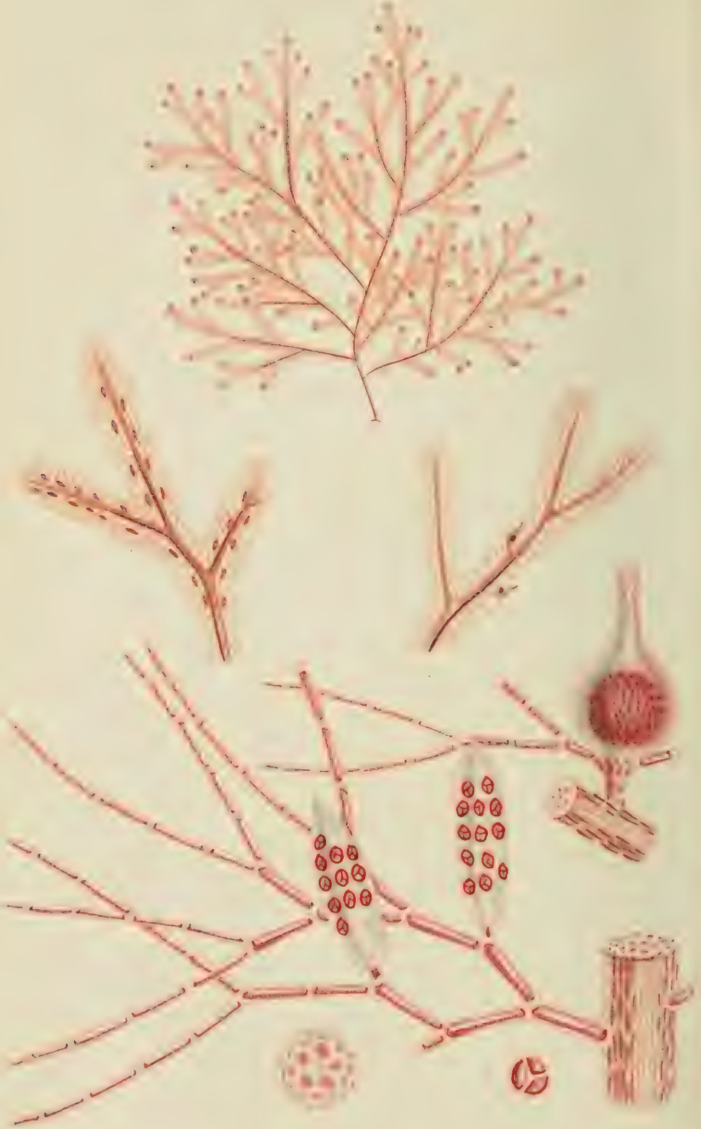

PLATE CCXXIV.

DASYA ARBUSCULA, *Ag.*

GEN. CHAR. *Frond* filamentous; the *stem* and *branches* mostly opake, irregulary cellular (rarely pellucid, longitudinally tubed), composed internally of numerous parallel tubes surrounding a central cavity; the *ramuli* jointed, single tubed. *Fructification* two-fold, on distinct plants; 1, ovate *capsules* (*ceramidia*) furnished with a terminal pore, and containing a tuft of pear-shaped spores; 2, lanceolate *pods* (*stichidia*), containing *tetraspores* ranged in transverse bands. DASYA (*Ag.*), from δασυς, *hairy*.

DASYA *arbuscula*; stems much and irregularly branched, beset on all sides with short, divaricating, dichotomous ramuli, scarcely tapering upwards; articulations from two to four times longer than broad; apices spreading, rather obtuse; stichidia elliptic-oblong, mucronate; ceramidia urceolate, with a long, cylindrical neck.

DASYA arbuscula, *Ag. Sp. Alg.* vol. ii. p. 121. *J. Ag. Symb.* p. 33. *J. Ag. Alg. Medit.* p. 118. *Harv. Man.* p. 98. *Endl. 3rd Suppl.* p. 44. *Mont. Ann. Sc. Nat.* vol. xv. p. 173.

DASYA Hutchinsiæ, *Harv. in Hook. Br. Fl.* vol. ii. p. 335. *Harv. in Mack. Fl. Hib.* part 3. p. 210.

CERAMIUM Boucheri, *Duby, 2nd Mem.* p. 15. *Crouan, in Desm. Pl. Crypt.* no. 302 and 303.

CONFERVA arbuscula, *Dillw.* t. G. (but not t. 85).

HAB. On rocks, at the verge of low water-mark; a more slender variety frequently dredged in from four to six or eight fathoms water. Annual. Summer. Not uncommon on the shores of the West of Ireland, and the North and West of Scotland. Particularly fine in Bantry Bay, *Miss Hutchins.* Rare in England. Salcombe, and the Land's End, *Mr. Ralfs.* Mewstone, Plymouth, *Rev. W. S. Hore.*

GEOGR. DISTR. Atlantic Shores of France and Spain. Mediterranean Sea.

DESCR. *Root,* a small disc. *Fronds* from one to three or four inches high, as thick as hog's bristles, irregularly much branched in a manner between alternate and dichotomous; sometimes all the main divisions are pretty regularly dichotomous; sometimes regularly alternate; the lesser branches are generally alternate, much crowded to the apices, and decompound above, the whole habit of the plant being strikingly bushy. *Stem* and *branches* opake, inarticulate, marked with irregular cells. *Ramuli* densely covering all parts of the frond except the older parts of the stem, directed to every side, one to two lines long, somewhat rigid, of nearly equal diameter throughout, divaricate, several times forked, the axils patent, articulate, their articulations from two to four times longer than broad, cylindrical. *Ceramidia* (rather rarely formed) borne on short, inarticulate peduncles, surrounded by a few jointed ramuli, roundish-urceolate, the apex produced into a long cylindrical neck; spores minute, of various shapes, densely crowded into a spherical mass. *Stichidia* borne on the ramuli, elliptic-oblong, with a sharp point, laxly cellular, containing three or four rows of roundish tetraspores. *Tubes* in the stem five, surrounding a cavity. *Substance* rather crisp, becoming soft on exposure, and closely adhering to paper in drying. *Colour* variable; sometimes clear crimson-lake; at other times more or less tinted with brown or yellow, and sometimes dark brown. In all cases the frond discharges a fine crimson powder on maceration in fresh water.

This pretty plant was originally discovered by Messrs. Hooker and Borrer on the shores of the Orkney Islands, and has been found at various places along the western shores of Britain, to the extremity of the Land's End. Its most abundant stations, are on the west of Ireland, in several bays of which coast it reaches a large size. On the Continent it has been found along the coasts of France and Spain, and in the Mediterranean.

There are two principal varieties of this species; one of them found on rocks near low-water mark, the other dredged in deeper water, and often on a sandy or shingly bottom, or among *Zostera*. In the first, which is represented in our figure, the frond is more robust and bushy, the branches more regularly alternate, and the colour frequently very dark. But this last character varies according to minor circumstances of each locality. This variety is frequently found in fruit, the *pods* being more commonly found than the *capsules*. In the second variety the stems are more slender, the branches much divaricated, and the order of branching more or less dichotomous, while the ramuli are less dense, and more squarrose, and so far as I know, always barren. At first sight such specimens might pass for a different species, but there are innumerable intermediate forms.

The *D. scoparia* of the Cape of Good Hope, and *D. collabens* of New Zealand nearly resemble this species in habit, but differ by some seemingly essential characters.

Fig. 1. Dasya arbuscula:—*of the natural size*. 2. A branch bearing *stichidia*. 3. Ramulus from the same, with two *stichidia*. 4. Tetraspore. 5. Branch bearing *ceramidia*. 6. A *ceramidium* from the same, on its stalk. 7. Transverse section of the stem:—*all more or less magnified*.

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Plate [illegible]

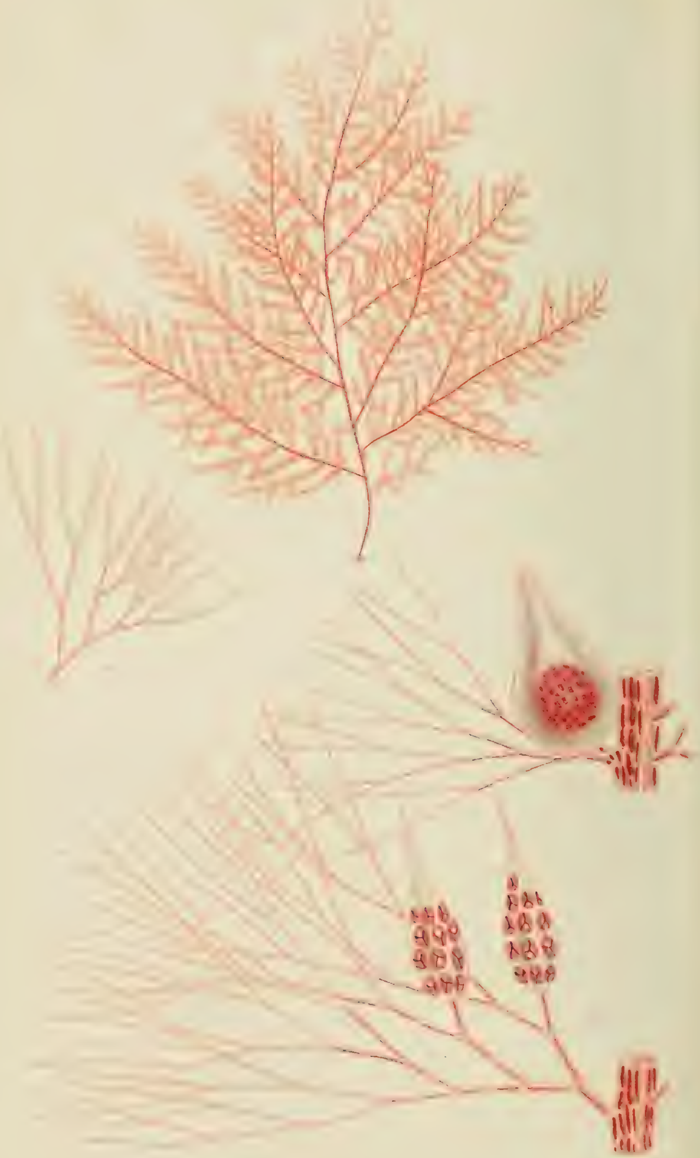

Plate CCXXV.

DASYA VENUSTA, *Harv.* (*n. sp.*)

Gen. Char. *Frond* filamentous; the *stem* and *branches* mostly opake, irregularly cellular (rarely pellucid, longitudinally tubed), composed internally of numerous parallel tubes surrounding a central cavity; the *ramuli* jointed, single tubed. *Fructification* two-fold, on distinct plants; 1, ovate *capsules* (*ceramidia*) furnished with a terminal pore, and containing a tuft of pear-shaped spores; 2, lanceolate *pods* (*stichidia*) containing *tetraspores* ranged in transverse bands. Dasya (*Ag.*), —from δασυς, *hairy*.

Dasya *venusta*; frond pyramidal, decompoundly pinnate; the branches clothed with exceedingly slender, flaccid, many times dichotomous, attenuated ramuli; articulations five or six times longer than broad; stichidia pedicellate, ovoid, much acuminate; ceramidia ovate-urceolate, with a protruding mouth.

Dasya venusta, *Harv. in Herb. T. C. D.*

Hab. Cast on shore. Annual. Summer and Autumn. Very rare. Discovered on the shores of Jersey, by *Miss White* and *Miss Turner*.

Geogr. Distr. —— ?

Descr. *Root*, a small disc. *Stem* three or four inches long, as thick as hog's bristles, undivided, but furnished throughout with numerous alternate, lateral branches, the lowest of which are longest, the rest gradually shorter towards the apex. *Branches* undivided like the stem, and like it furnished with a second series of lesser branches which likewise diminish in length towards the extremities; these again, in large specimens, bear a third series; each set being smaller and more slender than the preceding. The main stem is generally bare of ramuli; but all the branches and their divisions are clothed with very slender and flaccid, jointed ramuli, one or two lines in length, and very many times dichotomous: these rapidly diminish in diameter at each successive forking, and at length are reduced to cob-web thinness at the extremities. *Axils* acute. *Articulations* cylindrical, five or six times as long as broad. *Ceramidia* borne on short, inarticulate peduncles, surrounded by a few jointed ramuli, ovate-urceolate, gradually tapering into a conical neck, containing a dense, globose mass of small spores. *Stichidia* borne on the ramuli, pedicellate, ovate, much acuminate, with a long acute point, containing three or four rows of roundish tetraspores. *Substance* very tender and flaccid, strongly adhering to paper in drying. *Colour*, a fine crimson-lake. In fresh-water it gives out a crimson powder.—Sometimes the ramuli are tipped with linear-lanceolate, pod-like bodies, full of minute granules; apparently *antheridia* (fig. 4).

In the year 1846 I received from Miss White a small specimen of this plant, which at that time I laid aside, as a variety of *D. ar-*

buscula; and a short time afterwards Miss Turner supplied me with a fine specimen that at once convinced me that the plant was different from *D. arbuscula,* but left me in doubt whether it ought not to be referable to the *D. corymbifera* of J. Agardh. Of that species I possess a small morsel on talc, and as far as I can decide from an imperfect fragment, our plant is different; and it is also abundantly different from any other *Dasya* with which I am acquainted. In the byssoid fineness of its ramuli it approaches *D. elegans,* but differs in habit and in the form of its *stichidia* and *ceramidia.* The habit of our new plant is indeed rather that of *Pol. byssoides* or of *Seirospora Griffithsiana* than of any *Dasya* known to me, and may be said to be intermediate in aspect between those two beautiful plants. The conical outline is very characteristic; but it is on the extreme slenderness and repeated division of the ramuli, and the shape of the stichidia that I chiefly rely for its diagnosis.

I am much indebted to Miss White and Miss Turner for specimens of Jersey Algæ, and I would willingly discharge a portion of the debt by inscribing the present beautiful plant with the name of its fair discoverer, could I determine to which of the ladies the merit belongs. But as this point is doubtful, I have chosen a specific name which is at the same time descriptive of the elegance and grace of the plant and, in its derivation, allusive to the fairer portion of creation in general.

Fig. 1. DASYA VENUSTA; the *natural size.* 2. A ramulus bearing *stichidia.* 3. A *ceramidium* on its stalk. 4. Apex of a ramulus, bearing *antheridia*:—all highly *magnified.*

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Tab. CCLXVI

PLATE CCXXVI.

OCHLOCHÆTE HYSTRIX, *Thw. MSS.*

GEN. CHAR. *Frond* disciform, adpressed. Filaments cylindrical, radiating from a central point, irregularly branched, consisting of a single series of cells, each of which is most commonly produced above into a rigid inarticulated seta. *Endochrome* green. *Fructification* unknown. OCHLOCHÆTE (*Thw., MSS.*)—from ὄχλος, a *multitude*, and χαίτη, a *bristle.*

OCHLOCHÆTE *Hystrix*; plant very minute, pale green, hoary from its numerous rigid setæ.

HAB. On stems of grasses &c., in a lake of brackish water, called "The Little Sea," near Wareham, Dorset, *Rev. W. Smith*; also in fresh-water ditches near Bristol, upon the leaves of mosses; very rare. *G. H. K. Thwaites.*

DESCR. *Plant* disciform, frequently irregular in its outline, very minute, pale green, hoary from the multitude of rigid setæ with which it is covered. *Filaments* closely adpressed and adhering firmly to the substance on which the plant may be growing; radiating from a central point, irregularly branched, and frequently cohering laterally. *Cells* oblong, each usually furnished with a very long rigid tubular diaphanous seta. *Endochrome* granular, green. The fructification has not been observed. It is possible that the fresh-water specimens from the neighbourhood of Bristol may prove specifically distinct from the Wareham plant.

For the present we have placed *Ochlochæte* with the *Chætophoreæ*, from which family, however, it will eventually have to be removed, since it differs from *Chætophora* (that is, the typical species *C. elegans*,* Ag.) and *Draparnaldia* in some important particulars. The genera *Ochlochæte, Bulbochæte,* and *Coleochæte,* are very closely allied to *Tiresias,* Bory, (*Œdogonium,* Link; *Vesiculifera,* Hassall,) and bear the same relation to it that *Draparnaldia, Chætophora,* and *Stygeoclonium* do to the genus *Ulothrix,* of Kützing, (*Sphæroplea,* Berk., *Lyngbya,* Hassall). In the former of these two groups of plants the setæ, when present, are rigid continuous tubes; and the fruit, so far as has been observed, is not contained within an original cell of the filament, but each *sporangium* is in a new cell, formed, it is true, by the elongation of an original cell, but subsequently separated from it by a septum: this occurs in *Tiresias, Bulbochæte,* and *Coleochæte.* In *Draparnaldia,* on the contrary, and its immediate allies the diaphanous prolongations of the filaments are septate, each consisting of a series of elongated cells. The *sporangia,* also, in *Draparnaldia glomerata,* Ag., and *Chætophora elegans,* Ag., in which species we have observed them, are formed within the original cells of the ramuli, causing the latter to assume a moniliform appearance. Quaternate *opseospermata,* which are most probably gemmæ, likewise occur in these species, as well as in those of the genus *Stygeoclonium* of Kützing.

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* *Chætophora elegans*, Ag. in the state of fruit is evidently the *Gongrosira sclerococcus* of Kützing, whilst the same species with *opseospermata* appears to be the *Chætophora longæva* of Carmichael. From the inspection of an authentic specimen of *Chætophora pisiformis*, Ag., kindly given to me by my friend, the Rev. M. J. Berkeley, I have ascertained that this species is by no means congeneric with *C. elegans*, Ag., but has the fruit and setæ of *Coleochæte*, from which genus it would seem to be separated only by its erect, free, not adpressed filaments: and there can be little doubt, therefore, that *Chætophora tuberculosa*, Ag., is equally allied to *Coleochæte*. *Chætophora Berkeleyi* of Dr. Greville, and *C. pellita*, Lyngbye, have already been figured in the present work under the names respectively of *Leathesia Berkeleyi*, Harv., and *Cruoria pellita*, Fries; the former being closely allied to *Elachistea*, especially to *E. scutulata*, Fries; and the latter having an affinity rather with the *Nostochineæ.—Thwaites.*

[I am indebted to Mr. Thwaites for the above description, and for a beautiful figure from which our plate has been prepared.—*W.H.H.*]

Fig. 1. Fronds of OCHLOCHÆTE HYSTRIX:—*natural size.* 2. The same, *magnified.* 3. Small portion of a frond:—*very highly magnified.*

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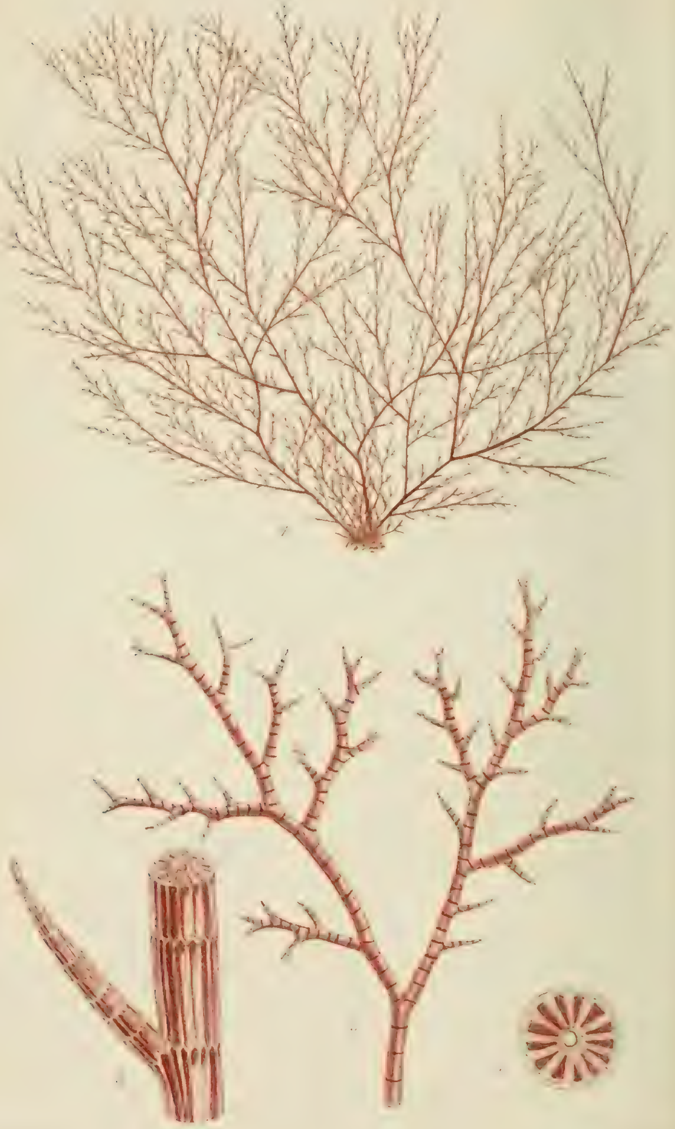

PLATE CCXXVII.

POLYSIPHONIA SUBULIFERA, *Ag.*

GEN. CHAR. *Frond* filamentous, partially or generally articulate; joints longitudinally striate, composed of numerous radiating cells or tubes, disposed round a central cavity. *Fructification* two-fold, on different individuals; 1, ovate *capsules* (*ceramidia*), furnished with a terminal pore, and containing a tuft of pear-shaped spores; 2, *tetraspores*, imbedded in swollen branchlets. POLYSIPHONIA (*Grev.*),—from πολυς, *many*, and σιφων, a *tube*.

POLYSIPHONIA *subulifera*; filaments setaceous, quickly becoming flaccid, flexuous, irregularly much branched; branches alternately decompounded, spreading, the lesser divisions long and rod-like; ramuli scattered, patent, subulate, simple or rarely bi-multifid; articulations visible in all parts of the frond, variable in length, many striate; tubes about thirteen, containing a coloured bag, and surrounding a narrow cavity.

POLYSIPHONIA subulifera, *Harv. in Hook. Journ. Bot. 1st Series*, vol. i. p. 301. *Wyatt, Alg. Danm.* no. 178. *Harv. Man.* p. 86. *Endl. 3rd Suppl.* p. 46 (no. 96).

HUTCHINSIA subulifera, *Ag. in Bot. Zeit.* 1827, p. 638. *Ag. Sp. Alg.* vol. ii. p. 97.

HAB. Dredged in four to five or ten fathoms water, generally on Nullipore banks. Annual. Summer. Torquay, very rare, *Mrs. Griffiths.* Weymouth, "parasitical on *Rytiphlæa pinastroides* and *Polyides rotundus*, between tide-marks," *Miss White.* Belfast Bay, *Mr. Templeton.* Carrickfergus and Roundstone, at the latter place very abundant, *Mr. M'Calla.*

GEOGR. DISTR. Adriatic Sea, *Agardh.* Coast of France, *Lenormand!*

DESCR. *Root* a disc, generally accompanied by grasping fibres, or else small discs rising from the lowest parts of the stems and branches. *Fronds* densely tufted, from four to six or eight inches in length, as thick as, or somewhat thicker than, hog's bristle, gradually attenuated to a point, much and irregularly branched. Main divisions irregularly forked, soon breaking up into a multitude of branches, which stand out from each other towards every side, and are repeatedly divided alternately. Lesser branches frequently long, rod-like, and subsimple, set, like the larger divisions, with short, awl-shaped, spine-like scattered ramuli. These ramuli are one or two lines long, patent, acute, and generally simple. In a young state all the apices terminate in colourless, byssoid fibres. *Articulations* varying much in length in different specimens and in different parts of the same specimen; sometimes nearly uniformly as long as broad, sometimes twice or thrice as long, many tubed. *Tubes* in the stem thirteen. *Substance* at first crisp, but quickly growing flaccid in the air. *Colour* a dark full red, becoming brown, and sometimes even black in drying. In fresh water this plant gives out a dark brown liquid. I have never seen fructification of either kind.

This species, though sometimes found, as at Weymouth, between tide-marks, much more commonly grows at a considerable depth, so as to escape notice altogether, except when accidentally thrown ashore after storms, or when sought by dredging. It was first described by Agardh, who gathered specimens of it at Venice, but had been found many years previously by the late Mr. Templeton, in Belfast Lough. In the herbarium of that gentleman, the specimens remained undescribed until 1840, when I recognised them, and introduced that Irish habitat into the Manual. *P. subulifera* had, however, previously, in 1833, been found in England by Mrs. Griffiths and Mr. Borrer. It appears to be much more abundant on the coast of Ireland, especially in Roundstone bay, where, on different occasions, I have dredged it in considerable quantities.

Its peculiar thorny habit, well expressed by the specific name, is so unlike that of any other British species of equal size, that it cannot well be confounded with any. To the naked eye it bears a greater resemblance to young specimens of *Rytiphlæa fruticulosa* than to anything else, but is more slender and flaccid, and readily known at all times by the distinctly articulate stem and branches, which have, both externally and internally, a very different structure.

Fig. 1. POLYSIPHONIA SUBULIFERA:—*of the natural size.* 2. Portion of a branch. 3. Joints and ramulus from the same. 4. Transverse section of the stem:—*all more or less magnified.*

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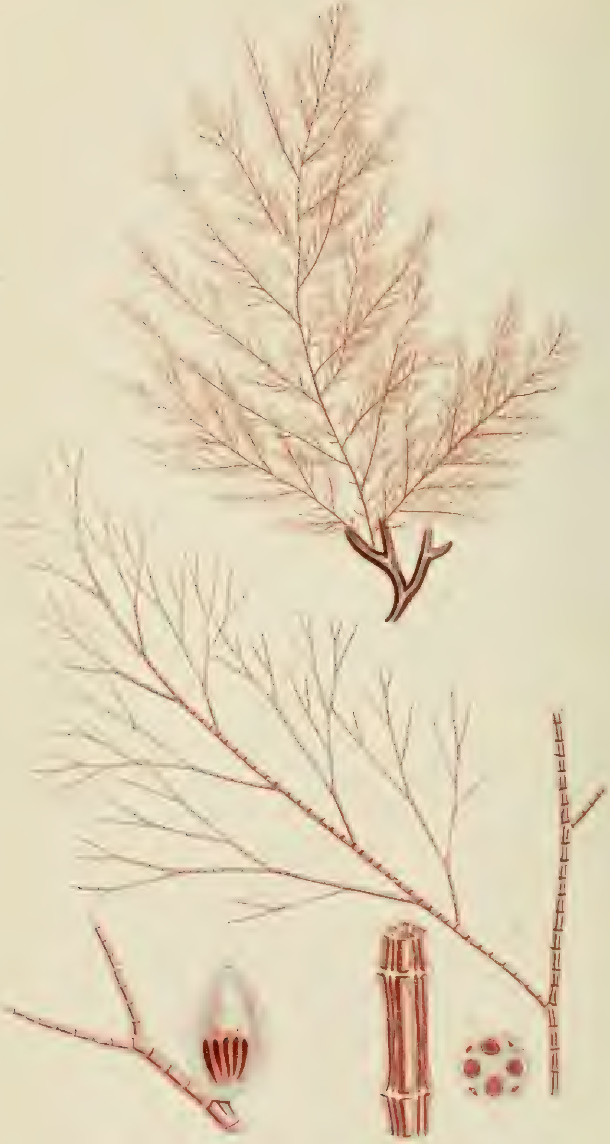

PLATE CCXXVIII.

POLYSIPHONIA GRIFFITHSIANA, *Harv.*

GEN. CHAR. *Frond* filamentous, partially or generally articulate; joints longitudinally striate, composed of numerous radiating cells or tubes, disposed round a central cavity. *Fructification* two-fold, on different individuals; 1, ovate *capsules* (*ceramidia*), furnished with a terminal pore, containing a mass of pear-shaped spores; 2, *tetraspores* imbedded in swollen branchlets. POLYSIPHONIA (*Grev.*),—from πολυς, *many*, and σιφων, a *tube.*

POLYSIPHONIA *Griffithsiana*; stem rigid, attenuated, alternately branched; branches long, patent, subsimple, furnished with numerous subdichotomous or alternately divided, slender, patent, flaccid ramuli; articulations of the stem, branches, and ramuli about once and a half or rarely twice as long as broad, with straight tubes; siphons in the stem four, with four alternate secondary ones; capsules broadly ovate, sessile.

POLYSIPHONIA Griffithsiana, *Harv. Man.* p. 91.

HAB. On the smaller Algæ between tide-marks. Annual. September. Parasitical on *Polyides rotundus* at Torquay, *Mrs. Griffiths.* Isle of Portland, *Miss White.*

GEOGR. DISTR. South coast of England.

DESCR. *Root* a small disc. *Fronds* laxly tufted, four to five inches long, and nearly as much in expansion. *Stem* undivided, set throughout its length with alternate, spreading branches, the lowest of which are longest, the rest gradually shorter upwards, giving the whole frond a pyramidal outline. *Branches* like the stem, beset with a second and third series of alternate lesser branches, the last of which are more or less furnished with dichotomous, flaccid, slender ramuli. All parts of the frond are conspicuously jointed; the articulations of the stem are from one and a half to twice as long as broad, marked with about five tubes, two of which are much narrower than the rest; those of the branches are about once and a half as long as broad, with two tubes only. A transverse section of the stem shows four primary and four secondary tubes. *Ceramidia* ovate, sessile, scattered on the ramuli. *Colour* a full red, inclining to brownish in drying but not much altered by fresh water. *Substance* rather rigid in the stem and branches, flaccid in the ramuli.

An elegant plant with a good deal the habit of small specimens of *P. violacea*, but known at once from that species by the distinctly jointed stem marked by straight tubes. It moreover resists the action of fresh water for a longer time, and the colour is also different. Some specimens of *P. elongella* have a slight look of our plant, but usually their peculiar ramification sufficiently marks these species.

P. Griffithsiana was discovered by Mrs. Griffiths in 1837, and has not since been found at Torquay. But I have had the satisfaction of receiving a specimen from Miss White from the Isle of Portland, agreeing in all essential characters with the Torquay plant. I have not compared either with continental specimens, and possibly this plant may be found under some other name in the works of continental botanists. As far as we yet know, however, it is confined to the south shores of England.

Fig. 1. POLYSIPHONIA GRIFFITHSIANA :—*of the natural size.* 2. One of the secondary branches and portion of a primary branch. 3. *Ceramidium* attached to a ramulus. 4. Joints from the stem. 5. Transverse section of the stem :—*all more or less magnified.*

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Plate CCXIX.

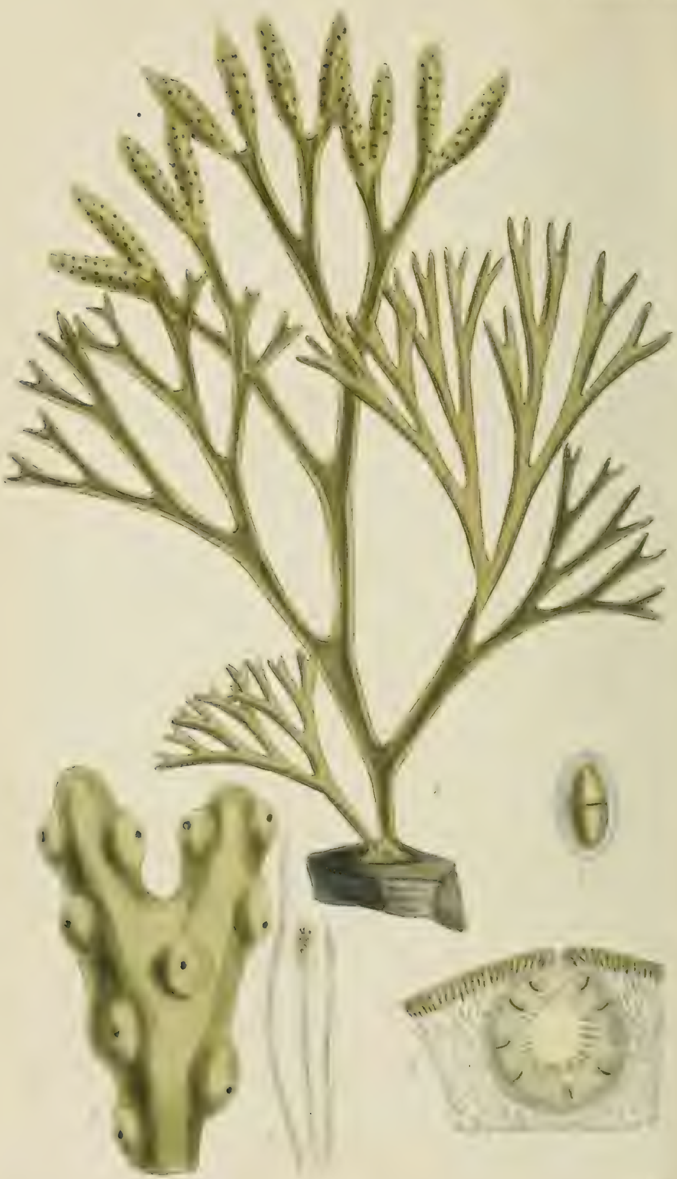

PLATE CCXXIX.

FUCUS CANALICULATUS, *Linn.*

GEN. CHAR. *Frond* linear, either flat, compressed, or cylindrical, dichotomous (rarely pinnated), coriaceous. Air-vessels, when present, innate, simple. *Receptacles* either terminal or lateral, filled with mucus traversed by a net-work of jointed fibres, pierced by numerous pores, which communicate with immersed, spherical conceptacles, containing parietal *spores* or *antheridia*, or both. FUCUS (*L.*),—from φυκος, a *sea-weed.*

FUCUS *canaliculatus*; frond linear, narrow, channelled on one side, without mid-rib or air-vessels, dichotomous; receptacles terminal, bipartite.

FUCUS canaliculatus, *Linn. Syst. Nat.* vol. ii. p. 716. *Fl. Dan.* t. 214. *Gm. Hist.* p. 73. t. 1. A. f. 2. *Lightf. Fl. Scot.* p. 917. *Velley*, t. 1. *With.* vol. iv. p. 99. *Turn. Syn.* p. 242. *Turn. Hist.* t. 3. *Sm. E. Bot.* t. 823. *Lamour. Ess.* p. 20. *Lyngb. Hyd. Dan.* p. 6. t. 1. *Ag. Sp. Alg.* vol. i. p. 96. *Ag. Syst.* p. 279. *Hook. Fl. Scot.* part 2. p. 96. *Grev. Fl. Edin.* p. 284. *Grev. Alg. Brit.* p. 18. *Hook. Br. Fl.* vol. ii. p. 268. *Harv. in Mack. Fl. Hib.* part 3, p. 169. *Harv. Man.* p. 21. *Wyatt, Alg. Danm.* no. 102. *Kütz. Phyc. Gen.* p. 352.

FUCUS excisus, *Linn. Sp. Pl.* p. 1627. *Mant.* p. 508. *Fl. Lapp.* p. 366. *Gunn. Fl. Norv.* vol. i. p. 96.

PELVETIA canaliculata, *Dne. An. Sc. Nat.* 1845, p. 12.

FUCODIUM canaliculatum, *J. Ag. Sp. Alg.* vol. i. p. 204.

HAB. On rocky sea-shores, between high-water mark and half-tide level. Perennial. Summer and autumn.

GEOGR. DISTR. Atlantic shores of Europe and North America.

DESCR. *Root*, a conical expansion, half an inch or more in diameter. *Fronds* densely tufted, from two to six inches or more in height, one to two or three lines in breadth, nearly of equal breadth throughout, deeply channelled on one side, and rounded on the other, many times dichotomous in a tolerably regular manner; the apices generally bifid. *Receptacles* terminating the branches, narrow-cuneate, either deeply cloven or bipartite, swollen, tubercular, containing numerous immersed conceptacles. *Spores* elliptical, at length separating, by a transverse division, into two sporules. *Substance* very tough and leathery. *Structure* dense. *Colour*, a clear olive when young, becoming brownish or foxy in old age, the receptacles at length greenish-yellow.

This species begins to vegetate on the very edge of high-water mark, often in places where it is only wet by the spray. In such situations it attains a dwarfish size, seldom reaching more than an inch or two in height, but the specimens sometimes arrive at maturity and produce fruit. Between this, its extreme limit, and the level of half-tide, the main crop is developed, the fronds attaining a greater size with the increasing depth of water; but beyond half-tide we rarely, if ever, meet with *Fucus canaliculatus*. It evidently requires by its organization, exposure to the atmosphere for a considerable period each day. Unlike most of its congeners it rarely covers wide spaces of rock, but more commonly grows in scattered tufts in places where, on the recess of the tide, the water rapidly drains off. It thus shows, in all its habits, a peculiar adaptation for drought, and its tough and close texture admirably fit it for long resisting the drying effects of sun and air. Still, it often becomes quite dry and crisp in a hot summer's day, and yet recovers life and flexibility on the return of the tide. None of our marine plants are less variable in character. Its channelled stem is always recognisable, and its ramification, if the frond be not injured, is invariably dichotomous. In cases of accidental injury, however, the wounded parts become proliferous and throw out numerous branches without order, converting such specimens into dense bushes.

Fig. 1. FUCUS CANALICULATUS :—*of the natural size*. 2. Part of a receptacle, with its immersed conceptacles. 3. Section of portion of the same, one of the conceptacles cut through. 4. A spore. 5. Some of the filaments which accompany the spores :—*all more or less highly magnified.*

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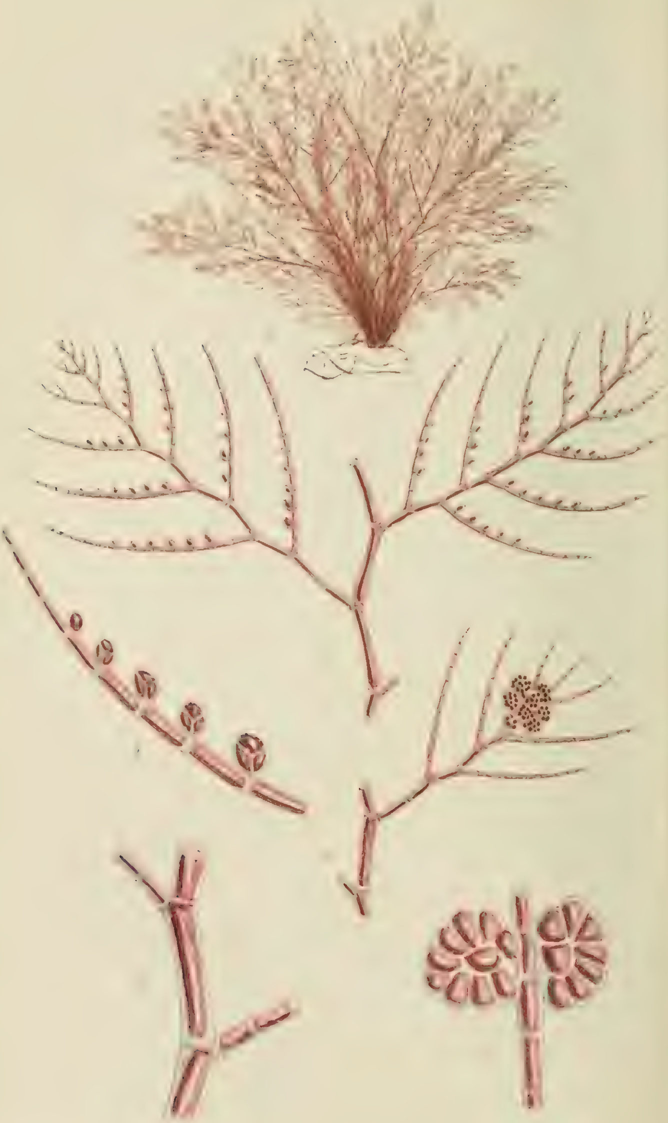

Plate CCXXX.

CALLITHAMNION ROSEUM, *Lyngb.*

Gen. Char. *Frond* rosy, or brownish-red, filamentous; stem either opake and cellular, or translucent and jointed; branches jointed, one-tubed, mostly pinnate (rarely dichotomous or irregular); dissepiments hyaline. *Fruit* of two kinds on distinct plants; 1, external *tetraspores*, scattered along the ultimate branchlets, or borne on little pedicels; 2, roundish or lobed, berry-like receptacles (*favellæ*), seated on the main branches, and containing numerous, angular spores. Callithamnion (*Lyngb.*),—from καλος, *beautiful*, and θαμνιον, a *little shrub*.

Callithamnion *roseum*; stems much and loosely branched; secondary branches long, flexuous, subdistichously plumulate; plumules lax, with a roundish outline, crowded towards the tops of the branches, simply pinnate; pinnæ long, spreading, curved; articulations of the stem and branches four and five times as long as broad, more or less filled with veins; those of the pinnæ twice or thrice as long as broad; tetraspores elliptical, four or five on each pinna, from the lower joints; favellæ tufted.

Callithamnion roseum, *Lyngb. Hyd. Dan.* p. 126. t. 39 (?). *Ag. Sp. Alg.* vol. ii. p. 164. *Harv. in Hook. Br. Fl.* vol. ii. p. 341. *Harv. in Mac. Fl. Hib.* part 3. p. 214. *Harv. Man.* p. 106. *Wyatt, Alg. Danm.* no. 44. *Endl. 3rd Suppl.* p. 34.

Phlebothamnium roseum, *Kütz. Phyc. Gen.* p. 375. t. 44. f. 1.

Ceramium roseum, *Roth, Cat. Bot.* vol. iii. p. 145. *Ag. Syst.* p. 139.

Conferva rosea, *E. Bot.* t. 966. *Dillw.* t. 17 (??).

Hab. On rocks and the larger *Fuci*, near low-water mark; frequently in æstuaries, or muddy places. Annual. Summer. Not uncommon.

Geogr. Distr. Atlantic shores of Europe.

Descr. *Fronds* densely tufted, three or four inches long. *Stems* as thick as hog's bristle at the base, in young plants pellucid, but in old, opake and full of veins, or internal fibres, excessively branched and bushy; the branches alternate, repeatedly divided. Lesser branches somewhat virgate, set throughout their length, at nearly every joint, with alternate simply pinnated plumules, of roundish or ovate outline. *Pinnæ* long, more or less incurved, either quite simple, or furnished with one or two small pinnulæ near the apex. *Articulations* of the stem and branches four or five times as long as broad, or more, somewhat swollen at the joints; those of the lesser branches and ramuli gradually shorter. *Endochrome* nearly filling the tube. *Tetraspores* elliptical, sessile on the inner faces of the pinnæ, one at each of the four or five lowermost joints. *Favellæ* generally terminating truncated branches, two or more together: sometimes several united in a berry-like mass. *Colour* in young specimens a fine purple-lake, in old brownish, becoming brighter in fresh-water. *Substance* membranaceous and soft, closely adhering to paper, but not gelatinous.

Callithamnion roseum is one of the longest described of the genus, and ought therefore, one would think, to be the best known. But, as with many old species, several plants which are now distinguished, were formerly confounded under this name, and thus it becomes a doubtful matter to which of the modern species the original synonyme *roseum* attaches. The species was first defined by Roth in his Catalecta. I have seen no specimen of the plant of this author, and the *type* which I have adopted, and here figure, is derived from a specimen received from Mr. Dawson Turner, and compared many years ago by that gentleman with Roth's plant, and from another sent by Mr. Borrer, as the plant of English Botany. These two specimens agree with each other and also with the specimens published by Mrs. Wyatt, in Algæ Danmonienses. As far, therefore, as the British flora is concerned, our notions of *Cal. roseum* are tolerably definite. It would be very desirable were our plant compared with the herbaria of continental authors.

Fig. 1. CALLITHAMNION ROSEUM :—*of the natural size.* 2. A pair of plumules and three articulations of a branch. 3. Part of a pinna, with tetraspores. 4. A small branch, bearing a cluster of favellæ. 5. Binate favellæ. 6. Joints from the lower part of the stem :—*all more or less highly magnified.*

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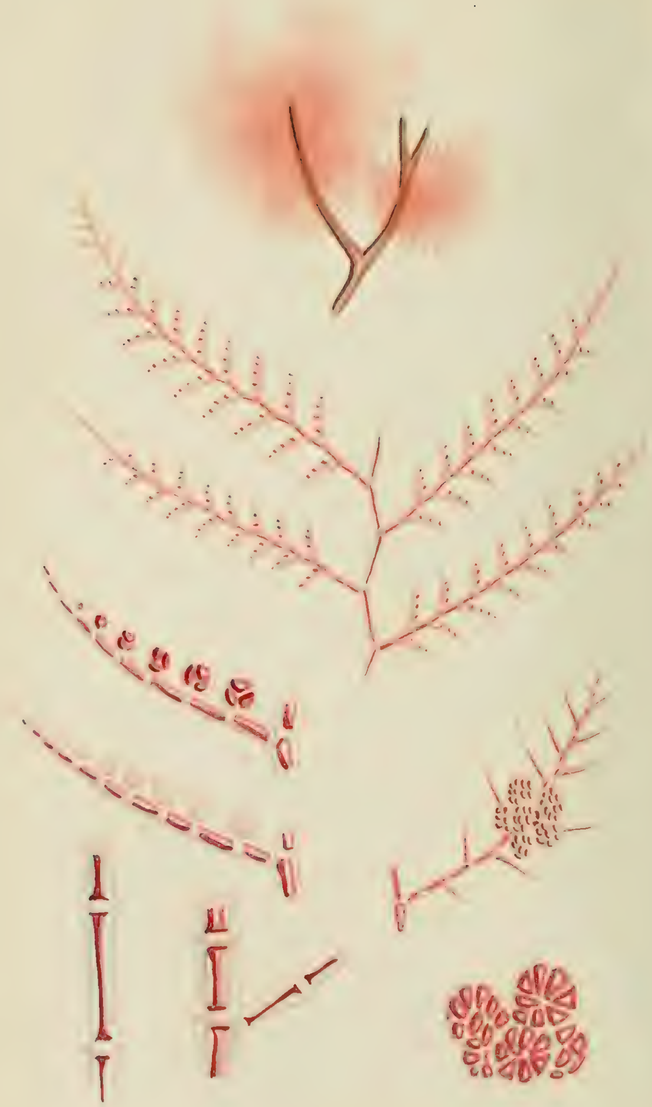

PLATE CCXXXI.

CALLITHAMNION POLYSPERMUM, *Ag.*

GEN. CHAR. *Frond* rosy, or brownish-red, filamentous; stem either opake and cellular, or translucent and jointed; branches jointed, one-tubed, mostly pinnate (rarely dichotomous or irregular); dissepiments hyaline. *Fruit* of two kinds on distinct plants; 1, external *tetraspores*, scattered along the ultimate branchlets, or borne on little pedicels; 2, roundish or lobed, berry-like receptacles (*favellæ*), seated on the main branches, and containing numerous, angular spores. CALLITHAMNION (*Lyngb.*),—from καλος, *beautiful*, and θαμνιον, a *little shrub.*

CALLITHAMNION *polyspermum*; tufts globose; filaments slender, delicate, loosely much-branched, irregularly divided below, distichously plumulate above; plumules long and narrow, simply pinnate; pinnæ short, simple, patent, acute, spine-like; articulations of the branches with a very narrow coloured tube, four or five times as long as broad, of the ramuli short; tetraspores globose, lining the inner face of the pinnæ.

CALLITHAMNION polyspermum, *Ag. Sp. Alg.* vol. ii. p. 169. *Harv. in Hook. Br. Fl.* vol. ii. p. 342. *Harv. in Mack. Fl. Hib.* part 3. p. 214. *Harv. Man.* p. 108. *Wyatt, Alg. Danm.* no. 140. *Endl.* 3rd *Suppl.* p. 34.

CALLITHAMNION Grevillii, *Harv. in Hook. Br. Fl.* vol. ii. p. 345. *Harv. Man.* p. 110. *Harv. in Mack. Fl. Hib.* part 3. p. 215.

CALLITHAMNION roseum, *Grev. Fl. Edin.* p. 311 (*not of Br. Fl.*)

CALLITHAMNION purpurascens, *Johnst. Berw. Fl.* vol. i. p. 240.

PHLEBOTHAMNIUM polyspermum, *Kütz. Phyc. Gen.* p. 374.

HAB. On various Algæ between tide-marks, frequently on *Fucus vesiculosus* and *F. serratus*. Annual. Summer. All round the coast.

GEOGR. DISTR. Atlantic shores of Europe.

DESCR. *Root* discoid, small. *Tufts* globose, one to three inches in diameter, dense. *Filaments* capillary, excessively branched; *stem* zigzag, with short articulations, traversed by a few fibres but not thereby rendered opake, irregularly divided, and either somewhat bare or well furnished with alternate, secondary branches. *Branches* long and slender, zigzag, bearing a second or third series, the latter alternately plumulate with considerable regularity. *Plumules* usually long and narrow, simply pinnate, or occasionally the upper part more compound. *Pinnæ* usually short, patent, subulate, sometimes recurved, in luxuriant specimens so far lengthened that the outline of the plumule becomes ovate. *Articulations* of the branches 4–5 times as long as broad, with a very narrow bag of endochrome; of the ramuli twice as long as broad, fully coloured. *Tetraspores* usually lining the inner faces of the pinnæ, globose. *Favellæ* of large size, in dense clusters, bursting from the rachis of a distorted plumule. Occasionally the place of tetraspores is occupied by round bodies (antheridia? or rather viviparous tetraspores) formed of innumerable minute cells, strung together. *Colour*, a brownish red, sometimes purplish. *Substance* membranaceous, adhering to paper. On being re-moistened, the frond exhales the odour of violets.

A common species, but variable in its characters, and gradually approaching *C. roseum* on the one hand, and *C. Hookeri* on the other. Our plate represents what we regard as the typical form, or *idea*, of the species. It is remarkable for the short, awl-shaped, simple pinnæ, beaded, on the inner face, with globose tetraspores. From this I formerly distinguished *C. Grevillii* by a plumule of broader and shorter outline, whose uppermost pinnæ were pinnulate at top. A more intimate acquaintance with the species of this genus, and an examination of a profusion of specimens exhibiting numerous variations from the original type of *C. polyspermum*, but all more referable to it than to any other species, have made me cautious of admitting the value of the characters I had formerly considered belonging to *C. Grevillii.* I now regard that species therefore as an imperfectly developed form of *C. polyspermum,* whose uppermost pinnæ are passing into the state of plumules.

C. polyspermum more frequently grows on the coarser *Fuci* than any other species, and sometimes clothes them with densely set, globose tufts, which in old age become blended together, concealing the greater part of the plant on which they grow. The finest specimens I have received were collected at Mount Edgecombe, by my liberal Plymouth correspondents, Messrs. Hore, Rohloff, and Cocks.

Fig. 1. CALLITHAMNION POLYSPERMUM :—*of the natural size.* 2. Portion of a branch, with four plumules. 3. Pinnæ with tetraspores. 4. Plumule with favellæ. 5. Favellæ detached. 6. Pinna with antheridia? 7. Joints from a branch. 8. Joints from the lower part of the stem :—*all more or less magnified.*

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Plate CCXXXII.

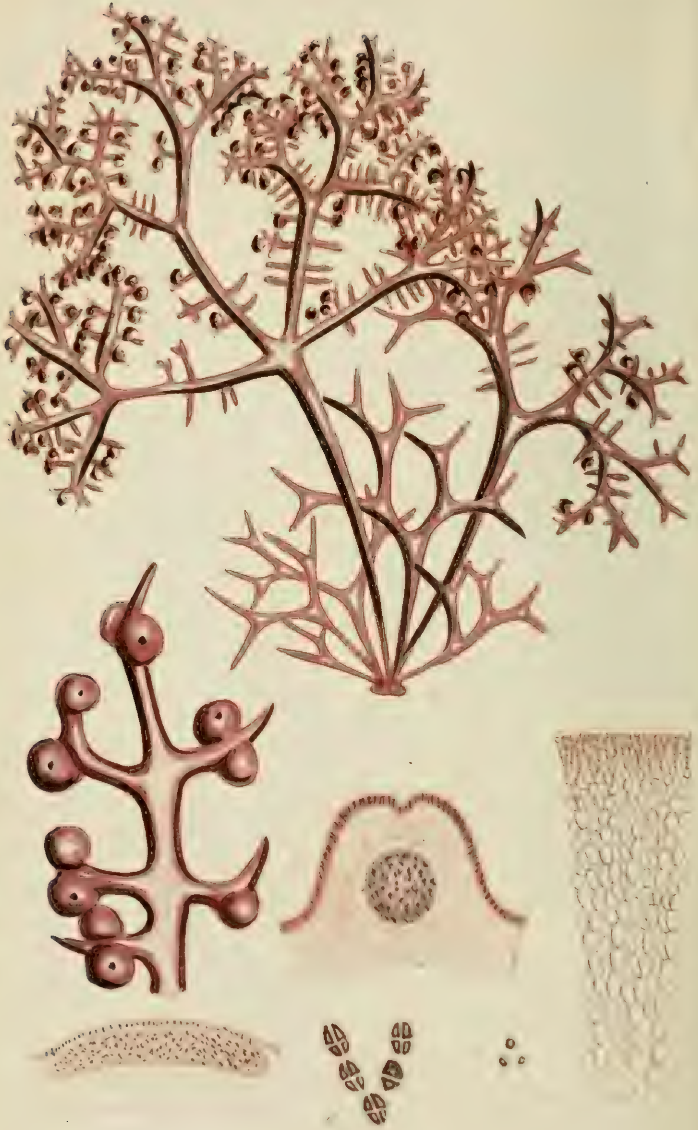

PLATE CCXXXII.

GIGARTINA PISTILLATA, *Lamour.*

GEN. CHAR. *Frond* cartilaginous, either filiform, compressed or flat, irregularly divided, purplish red; the *axis*, or central substance, composed of branching and anastomosing longitudinal filaments; the *periphery* of dichotomous filaments laxly set in pellucid jelly, their apices moniliform, strongly united together. *Fructification* double, on distinct plants; 1, external *tubercles* containing, on a central placenta, dense clusters of spores (*favellidia*) held together by a network of fibres; 2, *tetraspores* scattered among the filaments of the periphery, or aggregated in dense, immersed sori. GIGARTINA (*Lam.*), —from γιγαρτον, a *grape stone*, which the tubercles resemble.

GIGARTINA *pistillata*; frond compressed, stipitate, flabellately branched; branches repeatedly forked, with wide, rounded axils, naked, or pinnated with short, horizontal ramuli; apices acute; tubercles solitary or in pairs, on the ramuli; tetraspores chained together, in immersed sori, forming distortions in the branches.

GIGARTINA pistillata, *Lamour. Ess.* p. 49. *Grev. Alg. Brit.* p. 146. *Hook. Br. Fl.* vol. ii. p. 300. *Harv. Man.* p. 75. *Endl. 3rd Suppl.* p. 41. *Kütz. Phyc. Gen.* p. 402. t. 70. f. 1. *Mont. Fl. Algier.* p. 99.

SPHÆROCOCCUS gigartinus, *Ag. Sp. Alg.* vol. i. p. 274. *Ag. Syst.* p. 224.

FUCUS pistillatus, *Gmel. Fuc.* p. 159. t. 12. f. 1. *Lam. Diss.* p. 51. t. 27.

FUCUS gigartinus, *Linn. Syst. Nat.* vol. ii. p. 719. *Good. and Woodw. Linn. Trans.* vol. iii. p. 183. t. 17. f. 3, 4. *E. Bot.* t. 908. *With.* vol. iv. p. 111. *Turn. Syn.* vol. ii. p. 280. *Turn. Hist.* t. 28.

FUCUS Œderi, *Esper*, t. 135.

CERAMIUM gigartinum, *Roth, Cat.* vol. iii. p. 109.

HAB. On rocks, near low-water mark. Perennial. Winter. Very rare. Coast of Cornwall, in several places. Discovered by the *Hon. Dr. Wenman* before 1800. St. Ives, *Stackhouse.* Penzance, *Brodie.* Padstow, *Miss Hill.* Rocks under St. Minver, at the mouth of the Padstow River, *Mrs. Griffiths.* Mount's Bay, *Dr. M'Culloch.* Whitsand Bay, *Dr. Jacob* (1829); *Mr. Gilbert Sanders* (1848), &c. Jersey, *Miss Turner.*

GEOGR. DISTR. Atlantic shores of France and Spain. Mediterranean sea.

DESCR. *Root* a broad, fleshy disc. *Fronds* densely tufted, two to six inches high, compressed, rising with an undivided stem or stipe to the height of one or two inches, then branched in a fan-like manner; the branching normally dichotomous, and repeatedly forked, but from some of the internodes being very short, or altogether suppressed, various irregularities in branching occur. All the divisions are very patent, with wide, rounded axils; and the ultimate branches gradually taper upwards, and end in an acute point. Barren specimens and those which produce tetraspores, have the forked branches usually naked; in tubercle-bearing individuals, on the contrary, they are pinnated with short, horizontal, simple or forked ramuli, two to three lines long. *Tubercles* borne on the ramuli, either at their apices or more commonly below the point, which projects like a horn, solitary, or two or more together, usually very abundantly produced. *Tetraspores* contained in dark coloured swellings of the branches immersed in the substance; each sorus of large size, thick, containing innumerable chained cruciate tetraspores. *Substance* cartilaginous, shrinking very much in drying. *Colour*, a dull purplish or brownish-red. It does not adhere to paper in drying, unless after long steeping in fresh water.

For splendid specimens, fresh from the sea, of this very rare Alga, I am indebted to Mr. Gilbert Sanders of Plymouth, who was so fortunate, towards the close of last year, as to re-discover an old habitat where the plant had been sought for many years, and not found since 1829. From one of Mr. Sanders' newly gathered specimens our figure has been taken.

The characters of this species are so strongly marked, especially when in tubercular fruit, as is commonly the case, that it can scarcely be mistaken for anything else. In habit *G. mammillosa* comes nearest to it, but the channelled frond of that species affords a sufficient character. Barren specimens, or specimens with tetrasporic fruit, have rather the aspect of very narrow individuals of *Chondrus crispus*, but they seldom occur except in company with unmistakable forms.

All the specimens received from Mr. Sanders bore tubercles. I have since been favoured by Dr. Cocks, with specimens well furnished with tetraspores. The latter are contained in very dense sori, something resembling nemathecia, sunk in the substance of the frond.

Fig. 1. Gigartina pistillata:—*of the natural size.* 2. Part of a branch with fertile ramuli. 3. Section of a tubercle. 4. Spores from the same. 5. Section of a sorus. 6. Tetraspores from the same. 7. Transverse semi-section of a small portion of the frond:—*all more or less highly magnified.*

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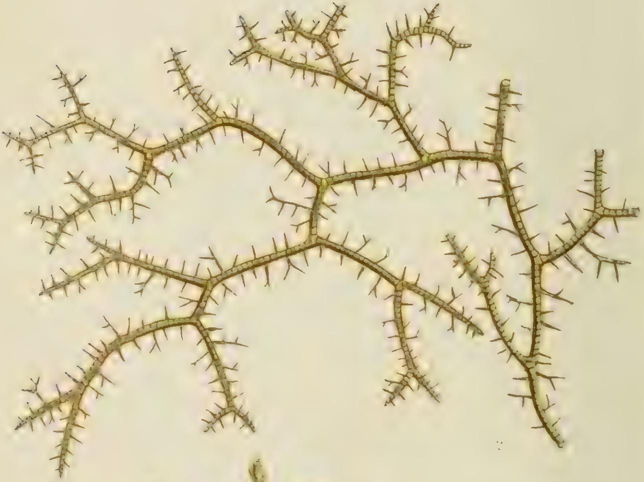

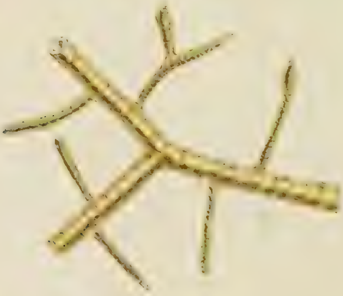

PLATE CCXXXIII.

ECTOCARPUS LANDSBURGII, *Harv.* (*n. sp.*)

GEN. CHAR. *Frond* capillary, jointed, olive or brown, flaccid, single-tubed. *Fruit* either spherical, elliptical, or lanceolate *utricles* (or *spores*) borne on the ramuli, or imbedded in their substance. ECTOCARPUS (*Lyngb.*), —from *εκτος, external,* and *καρπος, fruit.*

ECTOCARPUS *Landsburgii* ; filaments dark-brown, tenacious, intricate, much branched; branches irregularly forked, divaricated, zigzag, bristling with numerous short, spine-like, horizontal ramuli; articulations shorter than broad, the endochrome filling the cell, and recovering its shape on being moistened, after having been dried.

HAB. Dredged in deep water, in land-locked bays; rare. Annual. Summer. Lamlash, Isle of Arran, *Rev. D. Landsborough.* Roundstone Bay, Galway, *W. H. H.*

GEOGR. DISTR. Shores of Scotland and Ireland.

DESCR. *Filaments* capillary, one or two inches in length, densely entangled in small tufts, or rolled together in masses, irregularly much branched, of about the same diameter from the base to the apex. *Branches* spreading at very wide angles, dichotomous, or alternate, the lesser divisions very patent, horizontal, or recurved. *Ramuli* short, spine-like, horizontal, simple, or forked, not half a line in length, now thinly, now thickly scattered over the branches, rarely opposite. *Articulations* shorter than broad, filled by a coloured bag; the dissepiments and border very narrow. *Substance* tenacious, membranous, not closely adhering to paper, and not affected by long steeping in fresh water. *Colour*, a dark brown.

* * *

The first specimens which I received of this curious little plant were dredged by my friend the Rev. D. Landsborough in Lamlash Harbour, a circumstance which I record in the specific name; pleased with the opportunity thus afforded me of connecting Mr. Landsborough's name with the botany of an island whose history and natural beauties it has been to him a labour of love to illustrate by his pen.*

The ramification of our *E. Landsburgii* so nearly agrees with that of *E. distortus*, Carm., that I felt disposed, at first, to regard it as that species. But a careful comparison of both plants, placed side by side on the table of the microscope, has convinced me of their perfect distinctness. In *E. distortus* the endochrome is small, leaving wide dissepiments and colourless borders; the substance is exceedingly tender, and the branches break up into innumerable frustules when re-moistened. In fact, it is impossible to trace the ramification from the extreme *rottenness* of the moistened frond. In *E. Landsburgii* on the contrary, the endochrome completely fills the cavity; the dissepiments are mere lines; and the substance is exceedingly tough, and may be kept in fresh water for hours or days, without injury. These characters appear to me sufficient. We must also bear in mind that *E. distortus* is a littoral species, while our new species has only been found by dredging in deep water. It appears to be of rare occurrence. Mr. Landsborough found only a few small tufts; nor was I much more fortunate in collecting it at Roundstone. It is satisfactory to know, however, as establishing the character of the species, that the specimens from the west of Ireland agree in all respects with those from Scotland.

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* ARRAN, a poem in six cantos; and Excursions to Arran, with reference to the natural history of the island. By the Rev. D. Landsborough:—Edinburgh. 1847.

Fig. 1. ECTOCARPUS LANDSBURGII:—*of the natural size.* 2. A branching portion. 3. Part of the same. 4. Transverse section of the stem:—*all more or less highly magnified.*

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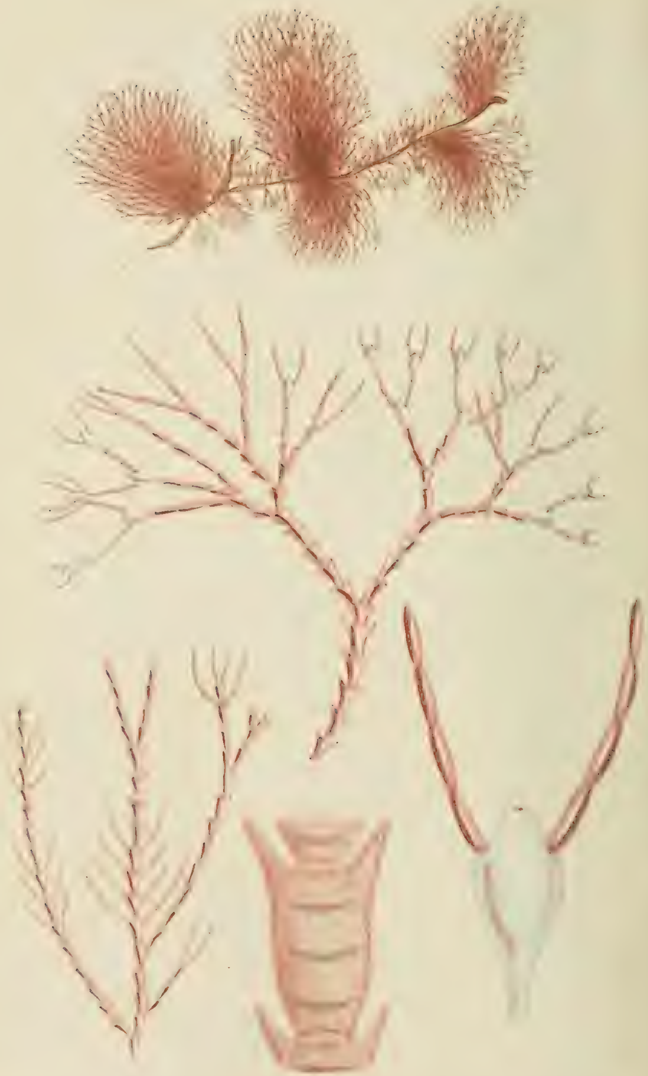

PLATE CCXXXIV.

JANIA CORNICULATA, *Lamour.*

GEN. CHAR. *Frond* filiform, articulated, dichotomously branched, coated with a calcareous deposit. *Fructification* urn-shaped *ceramidia,* formed of the axillary articulation of the uppermost branches (mostly two horned), pierced at the apex by a minute pore, and containing a tuft of erect, pyriform, transversely parted *tetraspores.* JANIA (*Lamour.*),—I suppose from *Janira,* one of the *Nereides.*

JANIA *corniculata*; articulations of the principal divisions obconical, compressed, their upper angles sharp and prominent; those of the uppermost ramuli cylindrical, filiform.

JANIA corniculata, *Lam. Cor. Flex.* p. 274. *Corall.* p. 123. *Gray, Nat. Ar. Br. Pl.* vol. i. p. 339. *Flem. Brit. Anim.* p. 514. *Johnst. Spong. and Lith.* p. 227. *Decne. Ess.* p. 111. *Endl. 3rd Suppl.* p. 49. *Kütz. Phyc. Gen.* p. 389.

CORALLINA corniculata, *Linn. Syst.* p. 806. *Pal. Elench.* p. 424. *Ellis and Soland. Zoop.* p. 121. *Turn. Br. Faun.* p. 212. *Lam. An. s. Vert.* 2nd Ed. vol. ii. p. 517.

HAB. Parasitical on the smaller Algæ, in rock pools between tide-marks, and in 4–5 fathoms water. Perennial? Summer. Southern shores of England and Ireland. Jersey, *Miss Turner.*

GEOGR. DISTR. Atlantic and Mediterranean shores of Europe.

DESCR. *Fronds* densely tufted, one or two inches high, repeatedly dichotomous, fastigiate, the branches spreading, gradually attenuated towards the apex. In young specimens the branching is always regularly forked, but older specimens frequently show in their lower parts a disposition to become pinnated, from lateral opposite ramuli issuing from their joints. These ramuli, as well as the terminal forkings, are much narrower than other parts of the frond. *Articulations* of the principal branches twice or thrice as long as broad, tapering to the base, gradually enlarged upwards, compressed, their upper angles more or less produced, sometimes extending at each side into a long conical horn; articulations of the lesser branches and ramuli cylindrical. *Ceramidia* urn-shaped, in the upper axils. On maceration in acid, transverse striæ become visible in the articulations.

The genus *Jania,* if we confine it to the dichotomously branched species, may be allowed to stand as distinct from *Corallina*—at least in habit;—but it must be admitted that the two genera approach very nearly, if they do not rather merge one in the other. Had we only to consider European forms we might think differently. But the shores of warm countries, and especially of Australia, yield beautiful species, having the pinnated habit of *Corallina* with the *antennated* fruit (if so I may call it) of *Jania*. These form the section of *Jania*, called *Haliptilon* by Decaisne, and I have already figured, on *Corallina squamata*, fruit which, did it occur on an Australian specimen, would entitle the individual furnished with it to a place in the subgenus *Haliptilon*.

Jania corniculata differs from the more common *J. rubens* chiefly, if not altogether, in the form of the lower articulations; much as *Corallina squamata* differs from *C. officinalis*. The species has been generally kept up by all authors, since the time of Ellis, who first distinguished it. On the British shores it is most common on the southern coast, while *J. rubens* is found all round the island.

Fig. 1. JANIA CORNICULATA :—*of the natural size.* 2. Portion of the branching stem. 3. Portion of another stem, becoming pinnated. 4. Ceramidium and ramuli. 5. Articulation of the stem after maceration in acid :—*all more or less magnified.*

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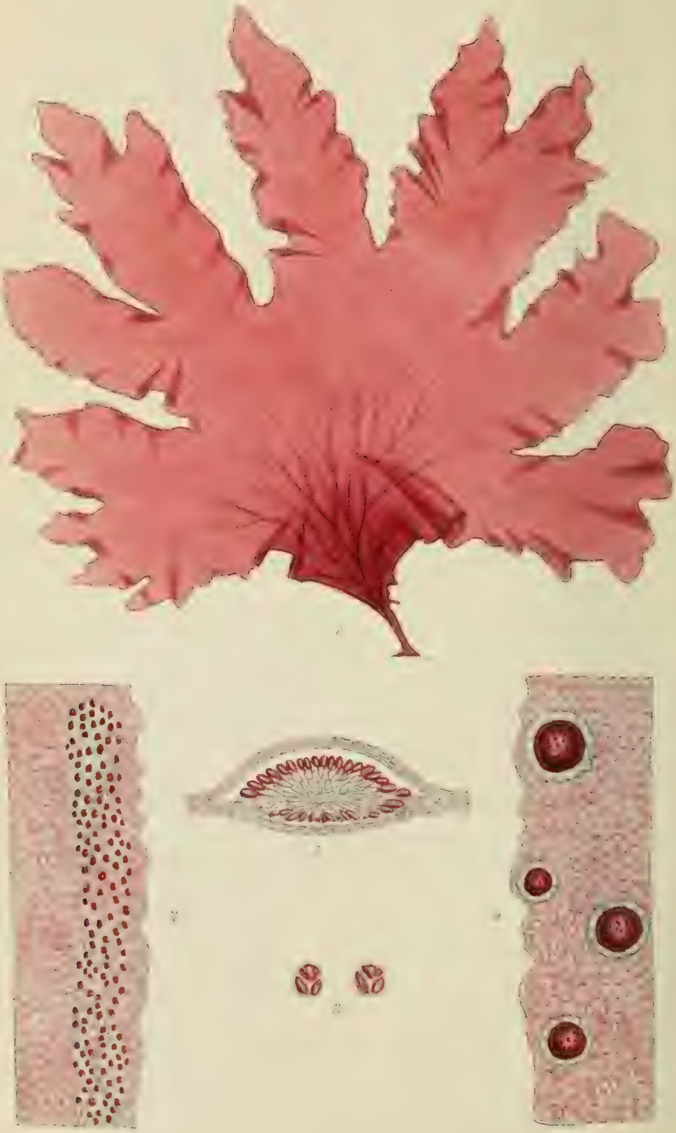

W.H.H. del. et lith.

PLATE CCXXXV.

NITOPHYLLUM GMELINI, *Grev.*

GEN. CHAR. *Frond* membranaceous, reticulated, rose-red (rarely purplish), irregularly cleft, veinless, or furnished with irregular veins towards the base. *Fructification* two-fold, on distinct plants; 1, convex *tubercles* (*coccidia*) immersed in the frond, and containing a mass of spores; 2, *tetraspores*, grouped into definite *sori* or spots, variously scattered over the frond. NITOPHYLLUM (*Grev.*),—corruptly formed from *nitor*, to *shine*, and *φυλλον*, a *leaf.*

NITOPHYLLUM *Gmelini*; frond short-stalked, fan-shaped, with a roundish outline, variously cleft into broadly wedge-shaped segments, waved, curled, rather rigid, marked near the base (and sometimes over the surface) with vague, vanishing nerves; spots of tetraspores linear, confined to the margin.

NITOPHYLLUM Gmelini, *Grev. Alg. Brit.* p. 82. *Hook. Fl. Brit.* vol. ii. p. 288. *E. Bot. Suppl.* t. 2779. *Wyatt, Alg. Danm.* no. 65. *Harv. in Mack. Fl. Hib.* part 3. p. 193. *Harv. Man.* p. 58.

AGLAIOPHYLLUM Gmelini, *Mont. Endl. 3rd Suppl.* p. 52. *Kütz. Phyc. Gen.* p. 443. *Endl. 3rd Suppl.* p. 52.

DELESSERIA Gmelini, *Lamour. Ess.* p. 36.

HAB. On rocks, and the larger Algæ, near low-water mark, and at a greater depth. Annual. Summer. South of England; particularly large and abundant near Plymouth. North and west of Ireland. Howth, *Miss Gower.* Jersey, *Miss White and Miss Turner.*

GEOGR. DISTR. Atlantic coasts of France and Spain.

DESCR. *Root* a small, conical disc. *Stem* from a quarter to half an inch in length, cylindrical and cartilaginous below, soon becoming compressed, and then expanding into the wedge-shaped base of the frond. *Frond* two to six inches in length, and as much or more in breadth, flabelliform, with a roundish outline, either nearly entire, with the margin cut into shallow lobes, or deeply cleft into numerous broad segments, which are either jagged or subdivided in a dichotomous manner; and sometimes cut into narrow ribbons. *Segments* cuneate at base, widening upwards, their apices rounded, or angularly cut. The *margin* is generally much undulated. From the base of the frond there issue numerous branching veins, which ramify over the surface, and gradually become fainter upwards; these in some specimens are faint, and soon lost, and in others are strongly marked and evident, even in the upper segments. *Tubercles* either confined to the margin, or scattered over the disc of the upper lobes, hemispherical, depressed, containing a large tuft of dark-red spores. *Tetraspores* disposed in linear *sori*, always placed just within the margin of the frond, and following its curvature. *Colour* a full deep-lake, becoming a bright pink in drying. *Substance* crisp, and somewhat rigid, crackling in the fingers; becoming flaccid in fresh-water. *Cells* of the surface large, irregularly hexagonal.

From all the British species of *Nitophyllum*, except *N. laceratum*, this handsome plant may be at once distinguished, when in tetrasporic-fruit, by the marginal position of the sori; from *N. laceratum* it can only be known by difference in form, in substance, and, in some measure, by its brighter colour. The usual narrow varieties of *N. laceratum* are so different from any state of *N. Gmelini*, that we should hardly anticipate the occurrence of individuals of doubtful characters, which seem to stand almost equidistant from either species. And yet some luxuriant specimens of *N. laceratum* so nearly approach the cloven varieties of *N. Gmelini*, that in a dried state especially, they are apt to deceive even a practised eye. When the plants are freshly gathered indeed, they are most easily separated,—*N. Gmelini* being known by a peculiarly crisp, rigid feel, and *N. laceratum* by softness, and at the same time toughness. The colour of the latter is more purple, and often reflects prismatic colours; and the nerves are much more clearly defined than in *N. Gmelini*.

Fig. 1. NITOPHYLLUM GMELINI:—*of the natural size.* 2. Portion of the frond, with a marginal *sorus.* 3. *Tetraspores,* from the same. 4. Portion of the frond with tubercles. 5. Section of one of the tubercles:—*all more or less highly magnified.*

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Plate CCXXXVI.

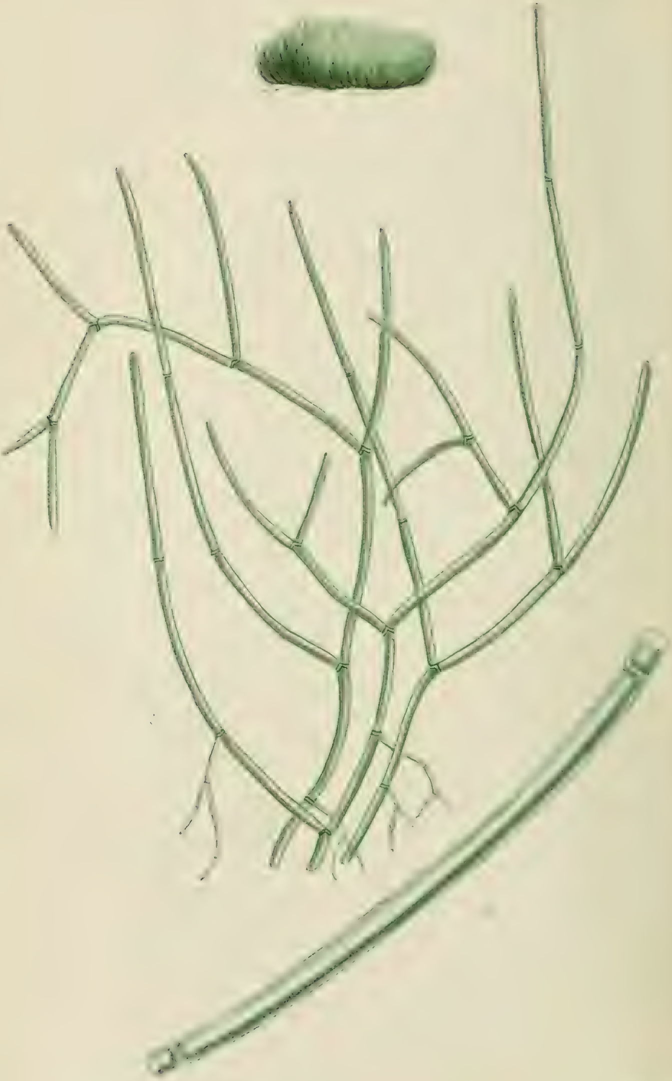

PLATE CCXXXVI.

CLADOPHORA REPENS, *J. Ag.*

GEN. CHAR. *Filaments* green, jointed, uniform, branched. *Fruit* aggregated granules or zoospores, contained in the joints, having, at some period, a proper, ciliary motion. CLADOPHORA (*Kütz.*), — from *κλαδος*, a *branch,* and *φορεω*, to *bear.*

CLADOPHORA *repens*; forming dense, cushion-shaped or globular tufts; filaments short, capillary, rigid, densely matted together, rising from root-like fibres; slightly branched; branches erect, subsimple, or forked, naked, or with a few distant, secund ramuli; articulations cylindrical, very long (ten to twenty times as long as their diameter).

CONFERVA repens, *J. Ag. Alg. Medit.* p. 13.

ŒGAGROPILA simplex, *Lenorm. in Herb. T. C. D.* (!)

HAB. Thrown on shore after a gale. Annual? Summer. Jersey, *Miss Turner.*

GEOGR. DISTR. Shores of the Mediterranean Sea. Atlantic coast of France, *Lenormand*!

DESCR. *Tufts* very dense, an inch or two in breadth, and about half an inch in thickness, globose or oblong, cushion-like, composed of innumerable, capillary filaments, closely matted together. The filaments are at first decumbent, connected by root-like fibres, which form the substratum of the tufts; from the decumbent filaments issue, at the joints, erect branches, half an inch in length, simple, or once forked, and either naked or furnished with a few simple, distant, secund ramuli. Each branch consists of about four or five, rarely more, articulations; and each ramulus usually of one, rarely of two articulations. The articulations are therefore of great length, as compared with their diameter; in our specimen the length is frequently as much as twenty times the breadth:—they are cylindrical, and the diameter at the tip of the branches is as great as at the base. The *colour* appears to have been a dark green; it is dingy and somewhat olive-green in the dried state. The substance is rigid, and the plant does not adhere to paper when dry.

In a recent number I had the pleasure of figuring a new species of *Dasya* from the shores of Jersey, and I have now to introduce, from the same locality, a *Cladophora*, discovered by my valued correspondent, Miss Turner, to whom I am indebted for many Jersey Algæ. Miss Turner informs me that the specimens were picked up on the beach after a heavy gale, in 1846; four only were found, and the plant has not since been noticed.

From one of these specimens, now in Herb. T. C. D., our figure has been taken.

Of the reference to M. Lenormand's *Œgagropila simplex* (seemingly a manuscript name) I am quite certain, a specimen communicated to me by that gentleman agreeing in all respects with Miss Turner's plant; but possibly the reference to the Mediterranean *Conf. simplex*, J. Ag., may be incorrect. And yet I have little hesitation in uniting our plant with that species. They agree in every respect except in the length of the articulations, which, in the Mediterranean plant, are shorter than in ours; and this slight discrepancy seems scarcely sufficient to separate plants so closely allied, by so many remarkable features.

Though not one of the handsomest, this is one of the most curious species of the genus. Outwardly it nearly resembles *C. Brownii*, but the form and proportion of the articulations are very different.

Fig. 1. CLADOPHORA REPENS; tuft:—*of the natural size.* 2. Portions of three filaments from the same. 3. An articulation from one of the filaments:—*magnified.*

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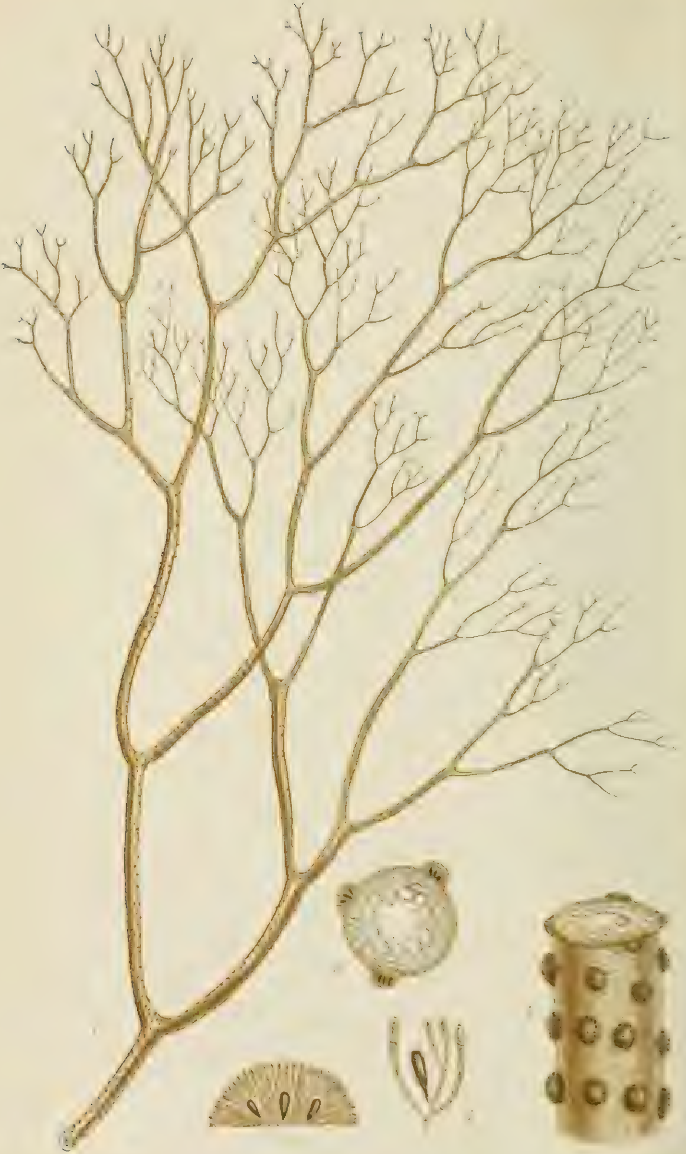

H. B. del.

[illegible]

PLATE CCXXXVII.

STILOPHORA LYNGBYÆI, *J. Ag.*

GEN. CHAR. *Root* a small, naked disc. *Frond* filiform, solid or tubular, branched. *Fructification,* convex, wart-like sori scattered over the surface, composed of obovate spores nestling among moniliform, vertical filaments. STILOPHORA (*J. Ag.*)—from στιλη, a *point* or *dot*, and φορεω, to *bear*; in allusion to the dot-like fructification.

STILOPHORA *Lyngbyæi*; frond tubular, at length distended, much branched, the branches dichotomous, spreading, with wide, rounded axils, much attenuated toward the apices; ramuli scattered, forked, capillary; sori subdistant, disposed in transverse lines.

STILOPHORA Lyngbyæi, *J. Ag. Symb.* vol. i. p. 6. *Sp. Alg.* vol. i. p. 84. *Endl.* 3rd *Suppl.* p. 26.

SCYTOSIPHON paradoxus, *Fl. Dan.* t. 1595. f. 2.

SPERMATOCHNUS paradoxus, *Kütz. Phyc. Gen.* p. 335.

CHORDARIA paradoxa, *Lyngb. Hyd. Dan.* p. 53. t. 14.

STRIARIA Grevilleana, *Pollexf. MS.*

SPOROCHNUS rhizodes β paradoxa, *Ag. Sp. Alg.* vol. i. p. 157. *Grev. Alg. Brit.* p. 43. *Hook. Br. Fl.* vol. ii. p. 275. *Harv. Man.* p. 27.

HAB. In land-locked bays, and estuaries, on a muddy and sandy bottom, in 4–10 fathom water. Annual. Summer. Several places on the shores of Scotland and Ireland, abundantly.

GEOGR. DISTR. Baltic Sea. Atlantic Coasts of Europe. Mediterranean Sea.

DESCR. *Root*, a small disc. *Fronds* from two to four or six feet in length, from one to two lines in diameter at their widest part, but tapering to a capillary fineness towards the apices, usually tufted, and sometimes covering the ground in continuous patches that spread over several square yards. *Stem* very much branched in a dichotomous manner, becoming irregular by the occasional suppression of one of the arms of the fork; the divisions widely spreading, with very broad, rounded axils; the forks distant below, gradually nearer towards the apex. The lower part of the stem becomes, in age, much distended, with a wide cavity and thin walls, the whole of the central cellular substance dying out; in younger parts it is more solid. *Warts* of fructification more distant than in *S. rhizodes*, and placed in transverse, slightly spiral bands, containing obovate *spores* attached to club-shaped paranemata. *Colour* a pale, testaceous brown, olive toward the tips, and becoming greener in drying, especially after the specimen has been steeped in fresh water. *Substance* when recent crisp, and very brittle; soon becoming flaccid and somewhat tough, giving out mucus. It closely adheres to paper.

Hitherto this plant has appeared in British works as a variety of *S. rhizodes*, figured at Plate LXX, and notwithstanding its different appearance, when *typical* specimens of each are under examination, it is not without hesitation that I admit the present to be specifically distinct. Those who are acquainted with the difference in aspect assumed by marine plants, according to the depth of water at which they grow, will best understand my doubts; remembering that the typical *S. rhizodes* grows within tide-marks, and *S. Lyngbyæi* at a considerable depth, beyond the reach of the tide. And the differences between the two are precisely of the nature of those caused by deep water. If we regard *size*, we must remember that *Asperococcus Turneri* in tide pools is seldom more than six inches long; and that when growing with our *S. Lyngbyæi*, which it frequently accompanies, it has fronds three or four feet in length and proportionably broad. So also *Gracilaria confervoides*, which grows to six or seven feet in length in deep water. The *distention* of the frond in *Stilophora* and the attenuation of the branches likewise increase with depth. On the whole, therefore, the characters typical of our *S. Lyngbyæi* become more strongly marked as the depth of water increases, and appear to me greatly to depend on locality. It is for this reason that I am inclined to question its right to be considered a species, distinct from *S. rhizodes*.

Fig. 1. STILOPHORA LYNGBYÆI;—part of a frond, *the natural size*. 2. Segment of a branch. 3. Cross section of the same. 4. Section of a wart. 5. Spore and paranemata, from the same;—*all magnified*.

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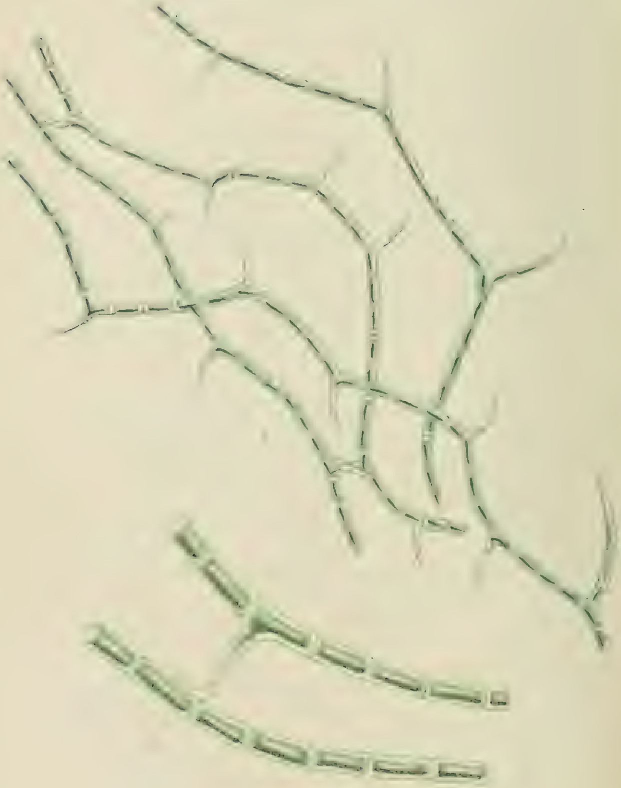

PLATE CCXXXVIII.

RHIZOCLONIUM[*] RIPARIUM, *Kütz.*

GEN. CHAR. *Filaments* green, jointed, uniform, decumbent, simple or spuriously branched; branches short and root-like. *Fruit*, granules contained in the cells. RHIZOCLONIUM (*Kütz.*),—from ῥίζοω, to *root*, and κλὼν, a *branch*.

RHIZOCLONIUM *riparium*; filaments long, slender, decumbent, pale-green, forming wide strata, flaccid, entangled, angularly bent, furnished at the angles with short, root-like processes (which sometimes, but rarely, lengthen into very patent branches, and often attach themselves to neighbouring filaments.)

RHIZOCLONIUM obtusangulum, *Kütz. Phyc. Gen.* p. 261. (*and probably R. Jurgensii and R. littoreum, ib.*)

CONFERVA riparia, *Roth Cat. Bot.* vol. iii. p. 216. *Eng. Bot.* t. 2100. *Dillw. Conf.* p. 111. *Sup.* t. *E. Ag. Syst.* p. 106. *Harv. in Hook. Br. Fl.* vol. ii. p. 359. *Harv. in Mack. Fl. Hib.* part 3. p. 230. *Harv. Man.* p. 140.

CONFERVA obtusangula, *Lyngb. Hyd. Dan.* p. 159. t. 55.

CONFERVA perreptans, *Carm. Harv. in Hook. Br. Fl.* vol. ii. p. 352.

CONFERVA tortuosa, *Wyatt, Alg. Danm.* no. 190. (*not of Dillw.*)

ZYGNEMA littoreum, *Lyngb. Hyd. Dan.* t. 59. (?)

HAB. On sand-covered rocks, near high-water mark. Annual. Summer. Not common. Bantry Bay, *Miss Hutchins.* Sunderland, *Mr. W. Backhouse.* Yarmouth, *Mr. Dillwyn.* Torquay, &c., *Mrs. Griffiths.* Appin, *Capt. Carmichael.*

GEOGR. DISTR. Shores of Northern Europe.

DESCR. *Filaments* prostrate, forming pale green strata, sometimes spreading in patches some square feet in area, slender, lying close together, and frequently matted inextricably. The threads are angularly bent, at intervals, and from each angle issues a short, root-like tapering ramulus, usually consisting of two or three cells, standing at right, or very obtuse angles with the main filament. This rarely lengthens into a proper branch: more generally it preserves the root-like character, and attaches itself to a neighbouring filament, and sometimes two such rootlets uniting together, bind the filaments still more closely together. I have not observed the roots inosculating with the attached filament, as the connecting tubes of *Zygnema* do. *Articulations* about twice as long as broad, full of a pale-green endochrome *Substance* flaccid, not very closely adhering to paper.

This curious little plant was first noticed as British by the late Miss Hutchins of Bantry, but notwithstanding the figures given by Dillwyn, and in English Botany, and its very distinct characters, it has been much misunderstood. The specimens published by Mrs. Wyatt, under the name *Conferva tortuosa*, belong, in the copies of her valuable work which I have examined and, I suspect, in all the others, to our *R. riparium*. It is a more slender plant than *C. tortuosa*, of a paler colour, and, above all, distinguished by the root-like fibres which issue at intervals, from the articulations; and the presence of which has induced Kützing to place it in a separate genus.

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[*] Misprinted *Rhizogonium* in the systematic index to the 1st volume.

I am not certain whether all the synonyms quoted above belong to this, or to several closely allied species. According to Prof. Kützing there are three or four distinct plants confounded under the *Conferva riparia* of authors, a point to determine which I have not sufficient data at hand. As regards the specimen now figured, it is at least certain that ours is the plant of Dillwyn, our figure having been prepared from one of the original specimens collected by Miss Hutchins.

Fig. 1. Rhizoclonium riparium; stratum,—*of the natural size*. 2. Filaments from the same; *magnified*. 3. A portion:—*more highly magnified*.

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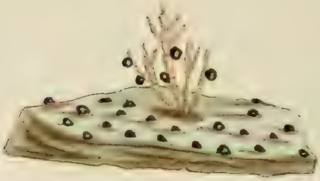

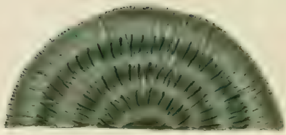

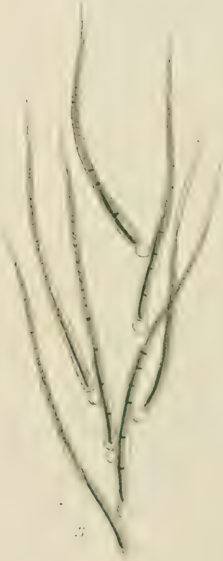

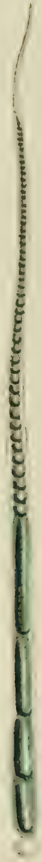

PLATE CCXXXIX.

RIVULARIA ATRA, *Roth.*

GEN. CHAR. *Frond* globose or lobed, fleshy, firm, composed of continuous radiating filaments, annulated within, each springing from a spherical globule. RIVULARIA (*Roth*),—so named by Roth, in allusion to the fluviatile habit of some of the first-discovered species.

RIVULARIA *atra*; fronds minute, scattered, globose, or hemispherical, firm, smooth, glossy black-green; filaments dark green, densely packed.

RIVULARIA atra, *Roth, Cat. Bot.* vol. iii. p. 340. *Ag. Syn.* p. 130. *Ag. Syst.* p. 24. *E. Bot.* t. 1798. *Harv. in Hook. Br. Fl.* vol. ii. p. 392. *Harv. in Mack. Fl. Hib.* part 3. p. 235. *Harv. Man.* p. 152.

EUACTIS atra, *Kütz. Phyc. Gen.* p. 241.

LINCKIA atra, *Lyngb. Hyd. Dan.* p. 195. t. 65.

LINCKIA hemispherica, *Schum. Enum.* vol. ii. p. 114.

TREMELLA hemispherica, *Linn. Syst. Nat.* vol. ii. p. 714. *Huds. Fl. Ang.* p. 565. *Lightf.* p. 900. *With.* vol. iv. p. 81.

CHÆTOPHORA atra, *Ag. Disp.* p. 43.

HAB. On rocks and stones, and on Corallines and other Algæ, between tide marks. Perennial? At all seasons. Very abundant.

GEOGR. DISTR. Shores of Europe.

DESCR. *Fronds* one or two lines in diameter, hemispherical when attached to flat surfaces, globose when growing on filiform Algæ, very hard, of an exceedingly firm, compact substance, and dark colour. *Filaments* subulate, attenuated, connected together in branching, subdichotomous series, filled with dark-green endochrome, which is annularly divided in the upper part, and coheres in oblong masses in the lower. Each filament springs from a transparent globule (or connecting cell).

A very common plant on all rocky shores, growing either on the rocks, or on the smaller Algæ, especially on *Cladophora rupestris* and *Corallina officinalis*. It forms small, hard wart-like balls or hemispheres, rarely as large as the seed of Sweet-Pea (*Lathyrus odoratus*), and sometimes completely covers the plant to which it attaches itself.

Carmichael describes an allied species, *R. applanata*, said to differ from *R. atra* in being flatter and thinner in substance, and growing in similar localities. This I have never seen.

Fig. 1. Rivularia atra :—*of the natural size.* 2. Vertical section of a frond. 3. Some of the filaments :—*magnified.* 4. A filament separated and *highly magnified.*

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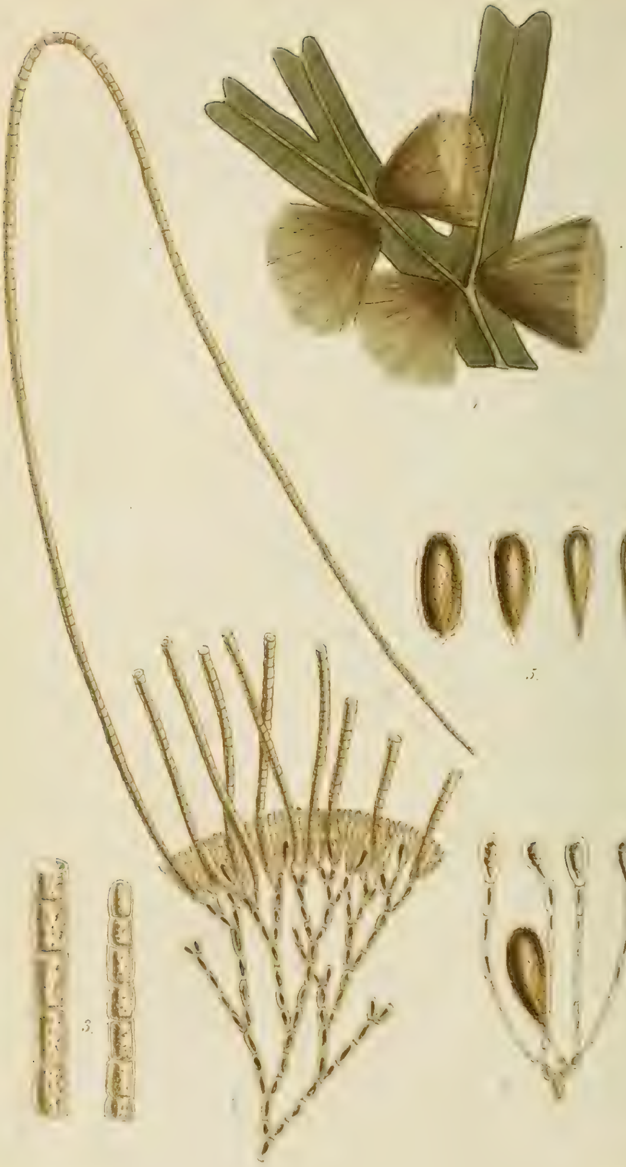
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Plate CCXL.

ELACHISTEA FUCICOLA, *Fries.*

Gen. Char. *Frond* parasitical, consisting of a dense tuft of free, simple, articulated, olivaceous filaments, rising from a common tubercular base, composed of vertical branching fibres closely combined into a cartilaginous mass. *Fructification,* pear-shaped spores attached to the base of the filaments, concealed in the tubercle, and frequently accompanied by paranemata. Elachistea (*Fries*), from *ελαχιστα,* the *least*; from the small size of these plants.

Elachistea *fucicola*; tufts pencilled; filaments elongate, flaccid, membranaceous, attenuated upwards; articulations once or twice as long as broad; tubercular mass spherical.

Elachistea fucicola, *Fries. Fl. Scan.* p. 317. *Aresch. Pug.* t. viii. f. 6–7. *J. Ag. Sp. Alg.* vol. i. p. 12.

Myrionema fucicolum, *Endl.* 3rd. *Suppl.* p. 23.

Phycophila fucorum, and P. Agardhii, *Kütz. Phyc. Gen.* p. 330.

Conferva fucicola, *Velley, Pl. mar.* No. 4. *Dillw. Conf.* t. 66. *Lyngb. Hyd. Dan.* t. 50. *Ag. Syst.* p. 103. *Harv. in Hook. Br. Fl.* vol. ii. p. 354. *Harv. in Mack. Fl. Hib.* part. 3. p. 227. *Harv. Man.* p. 131. *Wyatt, Alg. Danm,* no. 192.

Conferva ferruginea, *Ag. Syst.* p. 103.

Hab. Parasitical on *Fucus serratus* and *F. vesiculosus.* Annual. Summer and Autumn. Common.

Geogr. Distr. Atlantic shores of Northern Europe. Baltic Sea.

Descr. *Filaments* forming brush-like tufts, an inch in length, rising from a hemispherical, cartilaginous tubercle, which gradually increases in size as the plant advances in growth. This tubercle is composed of numerous dichotomous, articulated, vertical filaments, issuing from a common point, beneath the surface of the *Fucus* on which the parasite grows, and radiating in all directions. After several forkings the tips of the branches terminate in a cluster of linear club-shaped fibres or paranemata, three or four of which spring from each apex, and among these, which constitute the *periphery* of the tubercle, are attached both the *spores,* and the long *filaments* which form the brush-like tuft. *Filaments* an inch long, scarcely tapered at the base, much attenuated to the apex; the articulations once and a half to twice as long as broad. *Spores* at first club-shaped, then pyriform, and at length ellipsoidal. *Colour* olive-green, becoming brown or foxy.

This is the largest species, the longest known, and the commonest of the genus *Elachistea*. It infests *Fucus vesiculosus* and *F. serratus* almost wherever these plants grow, and may be found nearly at every season. At its first appearance it forms a minute pencil of greenish filaments rising from a scarcely perceptible tubercle. As it grows larger, the colour changes to brown, and the tubercle increases much in size, and at length becomes a button, attached by a central point. It then falls away and the plant perishes. The growth of other *Elachisteæ* is very similar.

By J. Agardh this genus is placed in *Ectocarpeæ*, but, in my opinion, incorrectly. The structure of the tubercle, in which the spores are lodged, is precisely that of the *Chordarieæ*, and did this tubercle constitute the whole plant, no doubt Professor Agardh would associate the genus with the latter family, for the whole structure of this part is analogous to that of *Leathesia*, and the nature and position of the *spores* the same. But then there are the long pencilled filaments composing the largest part of the frond; and these are very unlike anything found elsewhere in *Chordarieæ*, while they closely resemble the threads of an *Ectocarpus* in structure. Taking these filaments for *the frond*, Agardh would be correct in referring the genus to *Ectocarpeæ*. But, to my mind, the *tubercle*, as it contains the fructification, must be regarded as the most essential part of the structure; the *filaments* as an accessory part; and therefore I am of opinion that the genus is best placed in *Chordarieæ*.

Fig. 1. Tufts of ELACHISTEA FUCICOLA, growing on *Fucus vesiculosus*;—*the natural size*. 2. Part of a branching filament of the tubercle, with its paranemata, and excurrent filaments, one of which is bent back, the others cut off. 3. Portions of one of the excurrent filaments. 4. Paranemata and spore. 5. Spores in various stages of advancement;—*all magnified*.

ALPHABETICAL INDEX

TO

VOL. II.

(*The synonymes are printed in Italics.*)

Plate

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